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User's Guide for MPTER, A Multiple Point Gaussian Dispersion Algorithm with Optional Terrain Adjustment

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User's Guide for MPTER

A Multiple Point Gaussian Dispersion Algorithm with Optional Terrain Adjustment

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16. ABSTRACT The information presented in this user's guide is directed to air pollution scientists interested in applying air quality simulation models. MPTER is the designation for Multiple Point source algorithm with TERrain adjustments. This algorithm is useful for estimating air quality concentrations of relatively nonreactive pollutants; hourly estimates are made using the Gaussian steady-state model. The algorithm is most applicable for source-receptor distances less than 10 km and for locations with level or rolling terrain where a single wind vector for each hour adequately approximates the flow over the source and receptor sites. The terrain adjustment option is limited in application to receptors whose elevation is no higher than the lowest stack top elevation of the sources considered. Calculations are performed on the hourly meteorological data that the model requires: wind direction, wind speed, temperature, stability class, and mixing height. Emission information required of the point sources are source coordinates, emission rate, physical height stack diameter, stack gas exit velocity, and stack gas temperature. In addition to terrain adjustment, options are available for stack downwash, gradual plume rise, and buoyancy-induced dispersion. All printed output is optionally available so the user can avoid unneeded output volume. General information is contained in the Executive Summary and the first three chapters. The technical basis for the algorithm is given in Chapter 4 and Appendices A and B. The remaining material herein relates to use and understanding of the computer program for the algorithm.

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USER'S GUIDE FOR MPTER

A Multiple Point Gaussian Dispersion Algorithm With Optional Terrain Adjustment

by

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AUTHORS' AFFILIATION

The authors are on assignment to the U. S. Environmental Protection Agency from the National Oceanic and Atmospheric Administration, U. S. Department of Commerce.

PREFACE

One area of research within the Meteorology and Assessment Division is development, evaluation, validation, and application of models for air quality simulation, photochemistry, and meteorology. The models must be capable of describing air quality and atmospheric processes affecting the disposition of airborne pollutants, on scales ranging from local to global. Within the Division, the Environmental Operations Branch adapts and evaluates new and existing meteorological dispersion models and statistical technique models, tailors effective models for recurring user application, and makes these models available through EPA's computer network system.

MPTER is an adaptation of the point source portion of RAMR, using Gaussian point source modeling techniques.

Although attempts are made to thoroughly check computer programs with a wide variety of input data, errors are occasionally found. Revisions may be obtained as they are issued by completing and sending the form on the last page of this guide.

Comments and suggestions regarding this publication should be directed to:

Chief, Environmental Operations Branch
Meteorology and Assessment Division (MD-80)
Environmental Protection Agency
RESRCH TRI PK, NC 27711

Technical questions regarding use of the model may be asked by calling (919) 541-4564. Users within the Federal Government may call FTS 629-4564. The User's Guide is available from NTIS, Springfield, Va. 22161.

The magnetic tape containing all Fortran source codes for MPTER may be ordered from Computer Products, NTIS.

ABSTRACT

The information presented in this user's guide is directed to air pollution scientists interested in applying air quality simulation models. MPTER is the designation for Multiple Point source algorithm with TERrain adjustments. This algorithm is useful for estimating air quality concentrations of relatively nonreactive pollutants; hourly estimates are made using the Gaussian steady-state model. The algorithm is most applicable for source-receptor distances less than 10 km and for locations with level or rolling terrain where a single wind vector for each hour adequately approximates the flow over the source and receptor sites. The terrain adjustment option is limited in application to receptors whose elevation is no higher than the lowest stack top elevation of the sources considered. Calculations are performed on the hourly meteorological data that the model requires: wind direction, wind speed, temperature, stability class, and mixing height. Emission information required of the point sources are source coordinates, emission rate, physical height, stack diameter, stack gas exit velocity, and stack gas temperature.

In addition to terrain adjustment, options are available for stack downwash, gradual plume rise, and buoyancy-induced dispersion. All printed output is optionally available so the user can avoid unneeded output volume. General information is contained in the Executive Summary and the first three chapters. The technical basis for the algorithm is given in Chapter 4 and Appendices A and B. The remaining material herein relates to use and understanding of the computer program for the algorithm.

CONTENTS

Preface iii
Abstract. iv
Figures vi
Tables. vi
Acknowledgments viii

Executive Summary 1
1. Introduction. 3
2. Data Requirements 4
3. Recommendations 7
  Uses 7
  Assumptions. 9
  Sources of error and accuracy. 13

4. Basis for MPTER 15
  Gaussian modeling. 15
  Inputs 16
  Plume rise 18
  Dispersion Parameters. 19
  Gaussian plume equations 19
  Other considerations 20
  Special optional features. 20

5. Overview of Computer Program. 25
  Program description. 25
  Additional comments. 26

6. Discussion of Computer Aspects of MPTER 28
  Description of source code 28
  Data preparation 28
  Running costs and output volume. 41
  Error messages and remedial action 44

7. Input Card, Input File and Output File Specifications. 49

8. Example Problems. 65

References. 144
Appendices. 146

A. Point source computations 146
B. Plume rise. 150
C. Source program listing. 156

FIGURES

Number		Page
1	Adjustment of plume rise due to terrain.	24
2	Subroutine structure in MPTER.	27
3	Input data deck setup for MPTER.	56
4	System flow for MPTER.	57
5	Concentration as function of distance for source 2, hour 1 for four runs of example 2.	96

TABLES

Number		Page
1	Wind Profile Power Law Exponents Corresponding to a 0.03 m Roughness	17
2	Statistics Related to MPTER Source Code Size.	26
3	MPTER Output Volume	42
4	Maximum Output: 5-day run for 250 sources and 180 receptors	43
5	MPTER Card Type 1,2, and 3 - Title (3 cards).	49
6	MPTER Card 4 - Control and Constants (1 card)	50
7	MPTER Card 5 - Options (1 card)	51
8	MPTER Card 6 - Wind and Terrain (1 card).	52
9	MPTER Card Type 7 - Point Source (up to 250 cards). . .	52
10	MPTER Card Type 8 - Met. Data Identifiers	53
11	MPTER Card Type 9 - Specified Significant Sources (1 card).	53
12	MPTER Card Type 10 - Polar Coordinate Receptors (1 card).	53
13	MPTER Card Type 11 - Polar Coordinate Receptor Elevations (36 cards).	54
14	MPTER Card Type 12 - Receptor (up to 180 cards)	54
15	MPTER Card Type 13 - Segmented Run (1 card)	54

TABLES Cont'd

Number Page

16 MPTER Card Type 14 - Meteorology. 55

17 MPTER Optional Input File - Meteorological Data (Unit 11) 59

18 MPTER Optional Input File - Emission Data (Unit 15) 60

19 MPTER Optional Output Punched Cards - Average Concentrations (Unit 1) 60

20 MPTER Optional Output File - Partial Concentrations (Unit 10). 61

21 MPTER Optional Output File - Hourly Concentrations (Unit 12). 62

22 MPTER Optional Output File - Averaging - Period Concentrations (Unit 13) 63

23 MPTER Optional Temporary File - Values for High-Five Tables (Unit 14). 64

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EXECUTIVE SUMMARY

The MPTER computer code (Multiple Point source model with TERrain adjustments) provides a method to estimate air pollutant concentrations from multiple sources in rural environments, and can make optional adjustments for slight terrain variations.

Although the algorithm is based upon Gaussian modeling assumptions and incorporates the Pasquill-Gifford (P-G) dispersion parameter values, several technical options and various parameter values may also be entered as input. Hence, MPTER may be considered a research tool for exploratory use of various assumptions and parameter values.

* * * * * * * * * * * * * * * *

If estimates are to be submitted for review to satisfy regulatory requirements, certain parameter values and options may be required. Under these circumstances, specific applications of MPTER should be discussed with the appropriate regional meteorologist to ensure that the calculations are performed in the most appropriate way.

* * * * * * * * * * * * * * * *

MPTER can estimate the resulting concentrations at a maximum of 180 receptors from a maximum of 250 point sources. Gaussian assumptions and techniques are used to perform the estimates hourly, considering each hour as a steady state period. Required input information consists of point source and hourly meteorological data. Periods from one hour to one year may be simulated, with all output controlled by the user through selection of options.

Features of the algorithm include:

- Averaging periods of longer than 1 hour, if selected by user.
- Hourly meteorological data that may be read off punched cards for each hour, or from a tape (or disk) containing a year's data (same data as used for RAM or CRSTER).
- An optional terrain adjustment as a function of stability class.
- Inclusion or omission of stack downwash.
- Inclusion of gradual plume rise, or final rise only.
- Inclusion or omission of buoyancy-induced dispersion of pollutant at the source using the method of Pasquill.
- Input of anemometer height.
- Input of wind profile power law exponents as functions of stability.
- Concentration contributions that are available per hour and/or for the selected averaging period at each receptor from up to 25 sources.
- Concentrations available hourly and/or for the selected averaging period at each receptor.
- Optional output of the following information: average concentration over length of record, plus highest five concentrations for each receptor for four averaging times (1-, 3-, 8-, and 24-hour); and an additional averaging time selected by the user.
- Optional output files for further processing of concentrations that are available per hour and for each averaging period.

SECTION 1

INTRODUCTION

Although since the availability of UNAMAP (Version 3) in March of 1978 (EPA, 1978), there has been a model that will estimate impact from multiple sources in rural areas over flat terrain, RAMR (The rural version of RAM, Turner and Novak, 1978), and a model that will estimate impact from a single plant for situations where terrain features are no higher than the elevation of the lowest stack top for the plant, CRSTER (EPA, 1977), there has not been a readily available model that will consider both multiple sources and adjustments for slight terrain differences. The MPTER was assembled to fill this need.

MPTER, Multiple Point source model with TERrain adjustments, essentially bases its calculations for point sources on RAMR. The terrain adjustment factors are entered as functions of stability class. This algorithm is limited to terrain situations where receptor ground-level elevations are no higher than the elevation of the lowest stack top.

Computations can be made for 180 receptors and 250 point sources with the requirement that meteorological data be furnished for each hour that is simulated. Either short-term (several hours) or long-term (one year) calculations are available to the user. A number of options allows the user versatility in the amount of MPTER output; other options allow calculations of stack downwash, gradual plume rise, and enhanced initial plume size due to buoyancy induced turbulence.

Section 2 of this users guide gives the data requirements for employing MPTER and Section 3 discusses uses, assumptions, and sources of error and accuracy. These two sections should give the air pollution manager the background to decide if this algorithm is useful to his needs. Section 4 presents the mathematical basis for the algorithm, and the remaining sections provide information to the air pollution scientist or computer specialist wanting to prepare data and run the algorithm.

SECTION 2

DATA REQUIREMENTS

To estimate concentrations for any simulated time period, data for emissions, meteorology, receptors, and for program control are needed. These are discussed briefly here. More detail on proper formatting for data entry to the program is covered in Chapter 7.

EMISSION DATA

The following information on each point source is required as input:

East coordinate of point source, user units
North coordinate of point source, user units
Sulfur dioxide emission rate, g s^{-1}
Particulate emission rate, g s^{-1}
    (Only one of the two emission rates given above will be used in a given run.)
Physical stack height, m
Stack gas temperature, K
Stack inside diameter, m
Stack gas exit velocity, m s^{-1}
Stack ground-level elevation, user height units
    (This last data entry is only needed if the terrain adjustment option is used. Any height units can be selected by the user if used throughout.)

The east-north coordinate system can be provided in any consistent units.

METEOROLOGICAL DATA

Meteorological data can be entered by use of a year's prepared data on tape (or disk) or on punched cards with a separate card for each simulated hour. Data on tape or disk are arranged with daily records. Meteorological data prepared with RAMMET or the CRSTER preprocessor are quite acceptable to the MPTER program. Hourly data on cards include the following:

Year
Julian day
Hour
Stability class
Wind speed, m s^{-1}
Ambient air temperature, K
Wind direction, from which the wind blows, degrees clockwise from north
Mixing height, top of the neutral or unstable layer, m (not required for stable conditions)

RECEPTOR DATA

MPTER has the capability of generating an array of receptors in polar coordinate form (explained in more detail later). For most applications, information is entered on a separate punched card for each receptor. The following information is required:

East coordinate of receptor, user units
North coordinate of receptor, user units
Receptor height above local ground-level, m
Receptor ground-level elevation, user height units (The elevation is required only if the terrain adjustment option is used.)

CONTROL DATA

The following control information is needed for a run. Some additional information, to be discussed later, may be required depending upon options selected. Control information needed includes:

- Headings (for output)
- Year
- Starting Julian Day
- Starting Hour
- Number of averaging periods to be run
- Number of hours in each averaging period
- Code for selecting the pollutant for this run (sulfur dioxide or particulate)
- Number of significant sources (used for contribution to concentration from individual sources)
- Additional averaging time for high-five table (explained later)
- Conversion for user units (east and north coordinates)
- Conversion for user height units
- Half-life of pollutant used in this run
- Values to select each option
- Anemometer height
- Wind profile power law exponents (one for each stability)
- Terrain adjustments, if used (one for each stability)

Further discussion of input data is given in Chapter 7.

SECTION 3

RECOMMENDATIONS

USES

As stated in the introduction, MPTER is a multiple point source dispersion model for situations that would be considered rural. Because optional adjustments can be made for slight terrain variations, careful study of model inputs is required to ensure the user's problem is addressed, and to provide proper output for the problem at hand. Also, since the model may be applied to impact analyses in response to regulatory requirements, the user should determine if certain options and/or parameter values are required by the potential reviewer in order to be acceptable.

Its versatility allows MPTER to function as both a tool for research and for more routine impact analysis. In research, numerous parameter variations can be explored for comparisons with measured air quality data, and various sensitivities can be determined.

A frequent use of the model will be to assess air pollutant impact to compare with National Ambient Air Quality Standards. Since the short-term standards are not to be exceeded more than once a year, extremes of the frequency distribution must be determined. Brute force approaches may be required to estimate these extremes through calculation of a full year's data, as is done by CRSTER. Receptor locations are input by the user, except when the model's option is used for generating a polar coordinate set of receptors centered in a specified location.

Determining appropriate receptor locations where maximum impact might be expected is a difficult user problem. Little guidance is available for selecting optimum receptor positions, but the following three steps may prove helpful: 1) use screening methods to locate distances to maxima; 2) at these distances, use polar coordinate locations about each source of significance, analyzing a year's or more meteorological data, and then 3) make estimates using receptors at probable locations of source interaction.

In other diverse applications, MPTER can estimate concentrations from a single source for one simulated hour for one or more receptors, either at ground-level or varying heights above the ground, or it can simulate concentrations hour-by-hour for a year that result from 250 point sources at as many as 180 receptors.

MPTER is most applicable within 10 km of the source. Its use beyond this distance will be less accurate due to mesoscale influences, such as wind change with height, and to meteorological conditions that may vary during the time of transport.

The types of multiple-source applications for which MPTER is suited are similar to single-source applications of CRSTER, and include:

- Stack design studies
- Combustion source permit applications
- Regulatory variance evaluation
- Monitoring network design
- Control strategy evaluation for SIPs
- Fuel (e.g., coal) conversion studies
- Control technology evaluation
- Design of supplementary control systems
- New source review
- Prevention of significant deterioration (within 10 km of sources)

Computer time and costs will in general be proportional to the number of hours simulated, since each hour's simulation is done independently. Time and costs will also vary in proportion to the number of sources. Regarding receptors, time and costs will increase in proportion to the number of possible source-receptor pairs, i.e., the number of sources times the number of receptors. Use of a minimum number of receptors will therefore lower computer costs.

ASSUMPTIONS

The foundation of MPTER, including much of its computer code, is the point source portion of RAMR.

Gaussian Modeling

The following assumptions are made: 1) continuous plumes are diluted upon release by the wind speed at stack top; 2) dispersion from continuous plumes results in time averaged Gaussian distributions in both the horizontal and vertical directions through the dispersing plume; 3) concentration estimates may be made for each hourly period using the mean meteorological conditions appropriate for each hour; 4) the total concentration at a receptor is the sum of the concentrations estimated at the receptor from each source, i.e., concentrations are additive; and 5) concentrations at a receptor for periods longer than an hour can be determined by averaging the hourly concentrations over the period.

The upwind distance x and the crosswind distance y of the source from the receptor is determined as a function of the mean hourly wind direction. Dispersion parameter values are determined as functions of stability class and upwind distance. Equations to estimate concentration are selected dependent upon stability class, and, for neutral or unstable conditions, upon the relation of dispersion parameter value to mixing height (See Appendix A). The location of the receptor relative to the plume position is a dominant factor in the magnitude of the concentration.

Dispersion Parameter Values

The dispersion parameter values used in MPTER are the Pasquill-Gifford (P-G) parameters (Pasquill, 1961; Gifford, 1960) representative for open country (a roughness of approximately 0.03 m). The subroutines used to determine the parameter values are the same as in the UNAMAP programs PTDIS, PTMTP, and RAMR.

Except for stable layers aloft, which inhibit vertical dispersion, the atmosphere is treated as a single layer in the vertical that has the same rate of vertical dispersion throughout. Complete eddy reflection is assumed both from the ground and from the stable layer aloft, given by the mixing height for neutral and unstable stabilities.

Plume Rise

Plume rise is calculated using the methods of Briggs (See Appendix B). Although the plume rise from point sources is usually dominated by buoyancy, plume rise due to momentum is also considered. (Merging of nearby buoyant plumes is not considered.) Stack downwash is an optional consideration. Building downwash can not be considered.

Input Data

All input data are assumed to be representative for the area being modeled. Since concentration estimates are proportional to emissions, consideration of variations may be necessary, such as diurnal or weekday vs. weekend. MPTER can utilize hourly emissions as an option. The meteorological data consisting of wind direction, wind speed, temperature, stability class, and mixing height for each hour should be representative of the region being modeled. Representativeness and possible sources of error are discussed in Section 4. Wind speed is measured at the anemometer height and then extrapolated to the stack top, using power law wind speed profiles with the exponent dependent upon stability.

Mixing Height

The entire plume is completely eddy-reflected if the effective plume height is below the mixing height. The entire plume is assumed to be within the stable layer aloft if the effective plume height is above the mixing height.

MPTER does not include calculations for the transitional phenomenon of fumigation, which is the elimination of an inversion layer containing a stabilized plume from below (which causes mixing of pollutants downward, resulting in uniform concentrations with height beneath the original plume centerline).

Removal or Depletion

Transformations of a pollutant resulting in loss of that pollutant throughout the entire depth of each plume can be approximated by MPTER. If the loss to be simulated is realistic and occurs through the whole plume without dependence upon concentration, then this exponential loss may provide a reasonable simulation. If however, the loss mechanism is selective, the loss mechanism built into the model will not approximate the atmospheric chemistry very well. Examples of selective loss mechanisms include impaction with features on the ground surface, reactions with materials on the ground, or dependence on a given small parcel of air for concentration (requiring consideration of contributions from all sources to this parcel).

SPECIAL FEATURES

The following four features are options in MPTER.

Option 1: Terrain Adjustments

Consideration of the differences between local ground-level elevation at the stack and at the receptor is an option in MPTER. Terrain adjustment factors are entered by the user for each of the six Pasquill stability classes. These factors can be any real number between 0 and 1. Terrain adjustments can be simulated as in CRSTER by entry of 0's for all six stabilities, resulting in plumes that level off and remain at the same mean-sea-level elevation. Calculations are made by subtracting the difference, defined as the elevation of receptor ground-level minus the elevation of the source ground-level, from the effective plume height. More detail of the terrain adjustment is given in Section 4.

Of note to the user is that calculation of terrain adjustment is limited to receptors whose ground-level elevation is less than the elevation of the lowest stack top used in the run.

The terrain adjustment incorporated in MPTER is obviously simplistic. For the estimation of plume behavior in the vicinity of a single hill, the stable-plume fluid modeling studies of Snyder and Hunt (1978) have shown the importance of the Froude number, and of the location of the receptor and the plume relative to hill base and top. None of these parameters is considered here, but rather the relation of receptor and source ground-level elevations. The reader is therefore cautioned against assigning too great a significance to results obtained using the terrain adjustment option.

Option 2: Stack Downwash

A second optional feature of MPTER is considerations of stack tip downwash using the methods of Briggs. In such an analysis, a height increment is deducted from the physical stack height before determining momentum or buoyancy rise. This option primarily affects computations from stacks having small ratios of exit velocity to wind speed.

Option 3: Gradual Rise

Gradual plume rise has been made an optional feature of MPTER, because although the use of the $x^{2/3}$ dependence for rising plumes will determine average plume height with distances quite well, the plume axis is not horizontal during the rising phase. Therefore, dispersion is taking place perpendicular to the bent-over plume axis rather than vertically. The P-G dispersion parameters represent horizontal and vertical dispersion about a horizontal plume, which may not be appropriate for estimating dispersion of a rising bent-over plume. By making computations with and without the gradual plume rise, at least identification is possible of potentially high concentrations during the gradual plume rise phase. When gradual rise is not employed, computations are made using the final effective plume height.

Option 4: Buoyancy-Induced Dispersion

The final optional feature of MPTER is a method suggested by Pasquill (1976) for determining the buoyancy induced dispersion in both the horizontal and vertical directions. This feature is offered because emitted plumes undergo a certain amount of growth during the plume rise phase, due to the turbulent motions associated with the conditions of plume release and the turbulent entrainment of ambient air. Such dispersion, however will generally have little effect upon maximum concentrations unless the stack height is small compared to the plume rise.

SOURCES OF ERROR AND ACCURACY

The user would benefit appreciably if a given expected accuracy of the output could be associated with each air quality dispersion model. Unfortunately, such an association is not possible, since accuracy is dependent upon not only the model, but on the quality of the input information used in the application (including both emission information and meteorological data).

Since concentrations are directly dependent upon emissions, inaccurate emissions information is a source of error. The estimation of emission height, which is obtained through the calculation of plume rise, is dependent upon exit velocity and exit temperature. Correct specification of these parameters, as well as the physical characteristics of stack location, stack diameter, and stack height, is important. When hour-to-hour comparisons are made, hourly emission rates and exit velocities are important.

A second source of error is the representativeness of the meteorological data available for input. Generally, the greater the distance from the site to be modeled from the location at which the meteorological data are measured, the less representative the data. Slight topographic differences between two adjacent sites, however, may also cause the data at one site to be quite nonrepresentative of the other site (for example, two valleys oriented in different directions). Wind speed and direction are probably more subject to terrain-induced nonrepresentativeness than are mixing height or stability class.

Even if meteorological data from a site being modeled are considered to be climatologically representative, the extrapolation of the wind speed to the stack top of each source may still produce rather large errors on an hour-to-hour basis. Possibly the greatest single cause of inaccuracy in the model is incorrect input of the wind direction transporting the plume. Where the primary meteorological data are from near-ground measurements (< 10 m high), the taller and more buoyant a plume is, the greater the chance for wind direction inaccuracies.

In MPTER no attempt is made to extrapolate wind direction to stack top from a near-ground observation, since the deviation from the surface wind may be either clockwise or counterclockwise. Although surface wind direction may have little effect upon long-term concentrations (such as annual average) from single plants, and may not greatly alter estimates of extreme concentration values from such a source, use of surface wind direction to determine plume transport direction usually causes large errors in hour-to-hour estimates. This potential error is a very important consideration if attempting to compare air quality measurements with the model estimates. The error is also important in considering interactions of several sources where actual wind directions are significant in determining the location of a plume from a source passing over another source.

Since the P-G stability classes are used as input and the P-G dispersion parameters are used for plume spreading, the fact should be recognized that a change of only one stability class for input will cause large changes (factors of 5 to 10) in concentration at a receptor. Such changes are especially likely if the receptor is closer to the source than the distance to maximum concentration.

Other potential causes of large inaccuracies in concentration at a given point include wind speed errors, wind speed profile power law exponents that differ from actual variations, and nonrepresentative stability classes. However, if the user is searching for maximum impact and is relocating receptors in order to find such maxima, there will be considerably less sensitivity to wind speed differences and power law exponents, but still significant sensitivity to stability class.

Not included in this model are situations where wind speed varies markedly within the hour, whereby the effective plume height will fluctuate, causing increased vertical dispersion of the plume.

Maxima even at the extreme ends of the frequency distribution will tend to have more accuracy than hour-to-hour comparisons. Longer averaging times, such as annual concentrations, will also have less error than short averaging times. Background concentrations from sources not considered in the emission inventory may become more important for the longer averaging times.

SECTION 4

BASIS FOR MPTER

As mentioned, the point source portion of RAMR is the basis of MPTER, providing much of its computer code.

GAUSSIAN MODELING

The following assumptions common to Gaussian modeling are made in MPTER.

Plume Dilution

Continuous releases of pollutants from stacks are diluted by the mean (hourly) wind speed at the stack top.

Gaussian Horizontal and Vertical Distributions

Dispersion is assumed to occur such that time-averaged plumes over 1-hour periods have Gaussian (normal) distributions perpendicular to the plume centerline in the horizontal and vertical.

Steady-State

Calculations are made as if the atmosphere had reached a steady state. Concentrations for a given hour are calculated independently of conditions for the previous hour or preceding hours.

Concentration, Sum of Contributions

The total concentration for a given hour for a particular receptor is the sum of the estimated contributions from each source.

Average Concentrations

The average concentration over periods longer than 1 hour can be determined by averaging the hourly concentrations at the receptor over the period.

INPUTS

Emission Inventories

Since, for similar meteorological conditions, the contribution from a source to the concentration at a receptor is directly proportional to emission rate from that source, emissions must be expressed accurately. Attempts should be made to include time variations occurring from many air pollution sources, such as hourly changes per day or weekdays vs weekends. For cases that have complete emissions information, creation of a system is usually necessary that will calculate and store hourly emissions for the designated period to be simulated. This task can be accomplished independently of MPTER; the model is designed to accept hourly emissions in addition to annual emission rates that establish a correspondence between emissions and exit velocity.

Meteorological Conditions Representative of Region

The meteorological input for each hour consists of a value for each of five parameters: wind direction, wind speed, temperature, stability class, and mixing height -- all of which should be representative of the entire region containing the sources and receptors. Mixing height is required only if the stability is neutral or unstable.

Wind Speeds and Directions

Wind speeds and directions should be hourly averages. (National Weather Service hourly observations are actually averages of a few minutes at the time of the observation, usually 5 to 10 minutes prior to the hour.) Input winds should be representative of the entire region being modeled.

Emissions from continuous sources are assumed to be stretched along the direction of the wind by the speed of the wind at stack top. Thus, the stronger the wind, the greater the dilution of the emitted plume. In MPTER the input wind speed is assumed representative for the input anemometer height above the ground. The wind speed u_h at the physical stack height h is calculated from:

$$u_h = u_z \, (h/z_a)^p$$

where u_z is the input wind speed for this hour, z_a is the anemometer height, and the exponent p is a function of stability. If u_h is determined to be less than 1 m s^{-1}, it is set equal to 1.

Since the P-G dispersion parameters used in MPTER have greatest validity for a surface roughness of approximately 0.03 m (Pasquill, 1976), wind speed power law exponents for each stability for this roughness are based on Irwin (1979), given in Table 1.

TABLE 1. WIND PROFILE POWER LAW EXPONENTS CORRESPONDING TO A 0.03 METER ROUGHNESS

Stability	Exponent
A	0.07
B	0.07
C	0.10
D	0.15
E	0.35
F	0.55

As stated in the previous chapter, directional shear with height is not included, which means that the direction of flow is assumed to be the same at all heights over the region. The taller the effective height of a source, the larger the expected error in direction of plume transport. Although the effects of surface friction are such that wind direction usually veers (turns clockwise) with height, the thermal effects (in response to the horizontal temperature gradient in the region) can overcome the effect of friction and cause backing (turning counterclockwise with height) instead of veering.

In the program RAMMET, which processes National Weather Service hourly observations, the wind directions (reported to the nearest 10°) are altered by a randomly generated number from 0 to 9 used to add -4° to +5° to the wind vector. An extreme overestimate of concentration is thus prevented at a point downwind of a source during a period of steady wind, when sequential observations are from the same direction. Rather than allow the plume centerline to remain in exactly the same position for several hours, the changing wind allows for some variation of the plume centerline within the 10° sector. Although this step can in no way simulate the actual sequence of hourly events (wind direction to 1° accuracy cannot be obtained from wind direction reported to the nearest 10°), such variations can be expected to produce more representative concentrations over a period of record than those obtained using winds to only the 10° increments. (Sensitivity tests of this alteration for single sources have indicated that, where a few hours of unstable conditions are critical to producing high concentrations, the resulting concentrations are extremely sensitive to the exact sequence of random numbers used. Such a sequence might be two wind directions 1° apart versus two wind directions 9° apart. Differences of 40 to 50 percent in 24-hour concentrations from a single source have appeared in the sensitivity tests, due to the random wind direction variation alone.) Use of the most accurate wind information available for input is therefore necessary.

Mixing Height

If vertical temperature soundings are available from a representative location, they should be used with hourly surface temperatures to estimate hourly mixing heights for periods with neutral or unstable stability. If a series of National Weather Service hourly data are being processed by the program RAMMET, two values of mixing height per day are required. These are the maximum and minimum mixing heights as defined by Holzworth (1972). RAMMET provides a crude interpolation to obtain hourly mixing heights. This interpolation does not consider hourly surface temperatures.

PLUME RISE

Plume rise from point sources is calculated using the methods of Briggs (see Appendix B). Although the plume rise from point sources is usually dominated by buoyancy, plume rise due to momentum is also considered. Stack downwash can optionally be considered, though building downwash and the merging of nearby buoyant plumes cannot.

In ranking the point sources by the significance of their expected impact, only the rise due to buoyancy is processed, since it is expected to be the dominant plume rise factor. In the computation of the effect of each point source upon receptors for each simulated hour, however, all three of the above mentioned effects -- stack downwash, momentum plume rise, and buoyant plume rise -- can be considered. These computations are discussed in detail in Appendix B. Of note is that since wind speeds are not allowed to be less than 1 m s^{-1}, the stable buoyancy plume rise for calm conditions is not required and is therefore not included in the program code for MPTER.

DISPERSION PARAMETERS

The dispersion parameter values in MPTER are the P-G values (Pasquill, 1961; Gifford, 1960), which appear as graphs in Turner (1970) and in Gifford (Figure 2; 1976). These are most applicable to a surface roughness of 0.03 m (Pasquill, 1976). The subroutines used to determine these open-countryside parameter values are the same as in the UNAMAP programs PTDIS and PTMTP (EPA, 1978).

Except for stable layers aloft that inhibit vertical dispersion, the atmosphere is treated as a single layer vertically, with the same rate of vertical dispersion throughout the layer. Complete eddy reflection is assumed both from the ground and from the stable layer aloft, which is given by the mixing height.

GAUSSIAN PLUME EQUATIONS

The upwind distance x of the point source from the receptor and the crosswind distance, y, of the point source from the receptor are calculated using Equations (A1) and (A2) in Appendix A, for each source-receptor pair per simulated hour. Both dispersion parameter values σ_y and σ_z are determined as functions of this upwind distance x and stability class.

One of three equations is used to estimate concentrations under various conditions of stability and mixing height. Equation (A3) in Appendix A is used for stable conditions or for unlimited mixing; eddy reflection at the ground is assumed. For unstable or neutral conditions where vertical dispersion is so great that uniform mixing is assured beneath an elevated inversion, Equation (A4) in Appendix A is used. Finally, for unstable or neutral conditions where vertical dispersion is still small compared to the mixing height, Equation (A5) in Appendix A is used. This equation incorporates multiple eddy reflections from the ground and the base of the stable layer aloft. Simplifications to the above equations, valid if the height of the receptor z is assumed at ground level, are incorporated into the appropriate subroutines.

OTHER CONSIDERATIONS

Fumigation

The transitional phenomenon of fumigation, defined in Section 3, is not included in calculations made by MPTER. Conditions specified for each hour are calculated as if a steady-state had been achieved for those specified conditions.

Removal or Chemical Reactions

Transformations of a pollutant resulting in its loss throughout the entire depth of each plume is accomplished by an exponential decrease with travel time from the source. The input parameter is the length of time expected for loss of 50% (half-life) of the emitted pollutant. MPTER does not have the capability to change this parameter value during a given run. If the loss to be simulated occurs throughout the whole plume, without dependence upon concentration, then the exponential loss may provide a reasonable simulation if the loss rate is realistic. However, if the loss mechanism is selective, the loss rate will not be adequately modeled. Selective loss mechanisms include impaction with features on the ground surface, reactions with materials on the ground, or dependence on the concentration in a given small parcel of air (requiring consideration of contributions from all sources to this parcel).

SPECIAL OPTIONAL FEATURES

The following four special features, mentioned in Section 3, are options in MPTER.

Option 1: Terrain Adjustments

Consideration of the differences between local ground-level elevation at the stack and at the receptor is an option in MPTER. Terrain adjustment factors are entered by the user for each of the six P-G stability classes. These factors can be any real number between 0 and 1, which allows terrain to be regarded as in CRSTER by entry of 0's for all six stabilities. Plumes that level off and remain at the same mean-sea-level elevation can thus be simulated despite terrain influences. Calculations are made by subtracting the difference, defined as the elevation of receptor ground level minus the elevation of the source ground level, from the effective plume height.

The terrain adjustment can calculate for the elevations for which MPTER is limited using the same methods as the model Valley by entry of 1's for the first four stabilities (unstable and neutral) and 0's for the stable classes 5 and 6. The 1's allow full response of the plume to terrain factors, i.e., they simulate the plume rising over terrain features. (The entry of a 1 for the terrain adjustment factor for a given stability will compute as if the source and receptor were on a level surface.)

The equation used for the inclusion of the terrain adjustment is

$$H_A = H - \Delta E + F_T \Delta E$$

where

H_A = adjusted effective height
H = effective height
$\Delta E = E_R - E_S$
E_R = ground level elevation of receptor
E_S = ground level elevation of source
F_T = terrain adjustment factor.

Shown below are the adjusted effective heights for four values of the terrain factor:

$H_A = H$ for $F_T = 1$
$H_A = H - \Delta E$ for $F_T = 0$
$H_A = H - 0.7\ \Delta E$ for $F_T = 0.3$
$H_A = H - 0.1\ \Delta E$ for $F_T = 0.9$

The manner in which the terrain adjustment is simulated is depicted in Figure 1 for three values of the factor.

Of note to the user is that calculation of terrain adjustment is limited to receptors whose ground-level elevation is less than the elevation of the lowest stack top used in the run.

The terrain adjustment incorporated in MPTER is obviously simplistic. For the estimation of plume behavior in the vicinity of a single hill, the stable-plume fluid modeling studies of Hunt et al (1978) have shown the importance of the Froude number, and of the location of the receptor and the plume relative to hill base and top. None of these parameters is considered here, but rather the relation of the receptor and source ground level elevations. The reader is therefore cautioned against assigning too great a significance to results obtained using the terrain adjustment option.

Option 2: Stack Downwash

A second optional feature of MPTER is consideration of stack tip downwash using the methods of Briggs. In such an analysis, a height increment is deducted from the physical stack height before determining momentum or buoyancy rise. Use of this option primarily affects computations from stacks having small ratios of exit velocity to wind speed.

Option 3: Gradual Rise

Gradual plume rise determination has been made an optional feature of MPTER, because although the use of the $x^{2/3}$ dependence for rising plumes will determine average plume height with distance quite well, the plume axis is not horizontal during the rising phase. Dispersion is thus taking place perpendicular to the bent over plume axis rather than vertically. The P-G dispersion parameters represent horizontal and vertical dispersion about a horizontal plume, which may not be appropriate for estimating dispersion about a bentover plume. By making computations with and without the gradual plume rise, at least identification is possible of potentially high concentrations during the gradual plume rise phase. When gradual rise is not employed, computations are made using the final effective plume height.

Option 4: Buoyancy-Induced Dispersion

The buoyancy-induced dispersion feature is offered because emitted plumes undergo a certain amount of growth during the plume rise phase, due to the turbulent motions associated with the conditions of plume release and the turbulent entrainment of ambient air. Pasquill (1976) suggests that this induced dispersion, σ_{zo}, can be approximated by $\Delta H/3.5$, and the effective dispersion can be determined by adding variances, i.e.,

$$\sigma_{ze} = \sqrt{\sigma_{zo}^2 + \sigma_z^2}$$

where σ_{ze} is the effective dispersion and σ_z is the dispersion due to ambient turbulence levels. At the distance of final rise and beyond, σ_{zo} is a constant using ΔH of final rise. At distances closer to the source, the ΔH used to determine σ_{zo} is itself determined using gradual rise.

Since in the initial growth phases of release the plume is nearly symmetrical about its centerline, buoyancy-induced dispersion in the horizontal direction equal to that in the vertical is used, $\sigma_{yo} = \Delta H/3.5$. This expression is combined with that for dispersion due to ambient turbulence in the same manner as is shown above for the vertical.

In general, buoyancy-induced dispersion will have little effect upon maximum concentrations unless the stack height is small compared to the plume rise. Also, it is most effective in simulating concentrations near plume centerlines close to the source, where treating the emission as a point source confines the plume to a volume much smaller than the actual plume. It should be clarified here that the buoyancy-induced dispersion close to the source is calculated using the gradual rise in MPTER, even if the gradual plume rise option is not being used to determine the effective plume height.

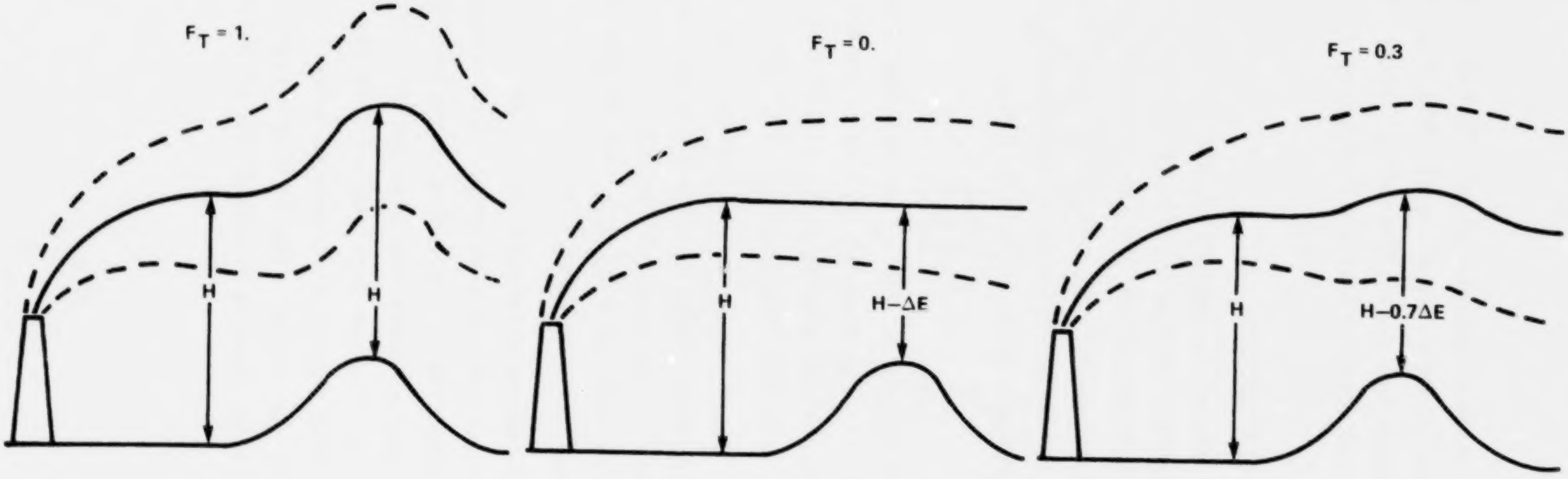

$F_T = 1.$
H
H
$F_T = 0.$
H
$H-\Delta E$
$F_T = 0.3$
H
$H-0.7\Delta E$

Figure 1. Adjustment of plume height due to terrain.

SECTION 5

OVERVIEW OF COMPUTER PROGRAM

With the exception that meteorological data output from RAMMET can be input, MPTER is a stand-alone program. Numerous options within MPTER allow control of its output, rather than relying upon numerous peripheral programs.

PROGRAM DESCRIPTION

A brief description of the main program and each subroutine used in MPTER is given. Some of the subroutines and various lines of code are cited directly from RAMR.

MPTER - Main Program: reads and checks input parameters, initializes variables, writes out initial information, determines significant sources, calls PTR for point source concentrations, reads and writes tapes/discs, calls OUTHR to print concentration contributions and summaries.

PTR - Subroutine called by MPTER to calculate the point source contribution to each receptor. Briggs plume rise equations are solved in this routine.

RCP - Subroutine called by PTR, RCP returns values of relative concentrations, σ_y, and σ_z.

PGYZ - Subroutine called by RCP, PGYZ calculates σ_y and σ_z for a given downwind distance and stability classification.

EXPOS - Block data containing coefficients and exponents used in determining high ground level concentrations that are used to rank the significant sources.

ANGARC - Function determining the appropriate arctan of east resultant wind component over the north resultant wind component with the resulting angle between 0° and 360°.

OUTHR - Subroutine which arranges and then prints tables of concentration. Number of tables that is output depends on the option combination specified.

RANK - Subroutine called by MPTER that ranks concentrations for four or five averaging times so that highest five concentrations are printed for each receptor.

ADDITIONAL COMMENTS

Figure 2 is an abbreviated flow diagram of MPTER showing its major loops and the relationships of the subroutines to each other and the main program.

The main program of MPTER primarily exists for input and bookkeeping; most technical calculations are performed by subroutine PTR. PTR calls subroutine RCP, which in turn obtains dispersion parameter values from subroutine PGYZ, then selects and solves the appropriate Gaussian equation. Subroutine RANK orders the highest five concentrations for each averaging time for each receptor. Subroutine OUTHR essentially provides the printed output.

The executable program for MPTER requires 48 k core on EPA's UNIVAC 1110. Table 2 gives information on the lines of code in MPTER and its subroutines.

TABLE 2. STATISTICS RELATED TO MPTER SOURCE CODE SIZE

ROUTINE	Total Lines of Code	Number of Program Statements	Number of Comment Lines	Number of Defined Variables
Main	1428	564	741	189
Block Data	38	6	13	4
ANGARC	29	22	7	4
PTR	275	120	152	83
RCP	228	119	108	48
PGYZ	85	66	14	34
RANK	58	30	25	31
OUTHR	307	191	98	45
MPTER SYSTEM	2448	1118	1158	262

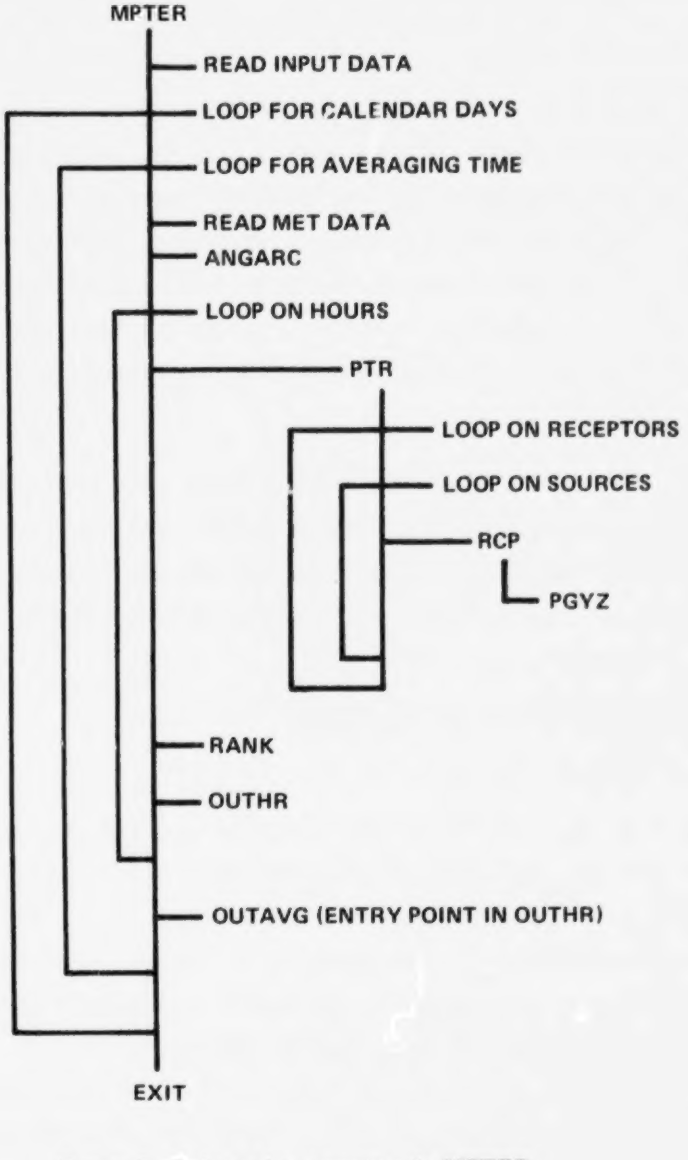

MPTER
READ INPUT DATA
LOOP FOR CALENDAR DAYS
LOOP FOR AVERAGING TIME
READ MET DATA
ANGARC
LOOP ON HOURS
PTR
LOOP ON RECEPTORS
LOOP ON SOURCES
RCP
PGYZ
RANK
OUTHR
OUTAVG (ENTRY POINT IN OUTHR)
EXIT

Figure 2. Subroutine structure in MPTER.

SECTION 6

DISCUSSION OF COMPUTER ASPECTS OF MPTER

A numbering system has been adopted for this section to provide a ready reference to the following discussion.

6.1 DESCRIPTION OF SOURCE CODE

Although few readers will have the need or desire to examine the source code in detail, several comments will be made about its organization. For the main program and most subroutines, explanatory statements and details on inputs are given prior to the first program statements. For the main program, a flow diagram is also given indicating the relationships of the subroutines and the major loops. Programs have been partitioned in sections when lengthy, and an outline of the sections follows the format statements.

6.2 DATA PREPARATION

Users preparing to make a run with MPTER should rely most heavily on Section 7, which details the specification of input, and Section 8, which gives runstream examples. This section discusses those elements that may require further explanation to some users and, in effect, might serve as a "troubleshooting" reference.

6.2.1 Control and Specification of Constants

6.2.1.1 Starting Date and Time --

The two-digit year and the three-digit Julian day for the start of the run are entered in the two portions of the indexed variable IDATE. The hour for the start of the run (between 1 and 24) is entered in IHSTRT. These data are used somewhat differently depending upon whether the meteorological data are entered through a file prepared by RAMMET, or upon hour-by-hour punched cards. (See discussion of this option below, 6.2.2.3.) If data are entered on cards, all three values are replaced and are relatively unimportant. If data are read from the preprocessed file, these variable values are used to position the file so that the first meteorological data read are for the proper day.

6.2.1.2 Number of Periods, Number of Hours --

Any run of MPTER will be for a given simulated length of record from one hour to one year. The simulation is done hour-by-hour, with an optional printout of concentration estimates at each receptor for each hour (see 6.2.3.3 below). Printout of concentration estimates for one other averaging period is also available, the length in hours of which is a data entry, the variable, NAVG. The number of these averaging periods in the run is the value entered for NPER.

6.2.1.2.1 Example -- Simulation is desired of a three-day (72-hour) length of record, obtaining 24-hour averages as part of the run. NPER will equal 3, and NAVG will equal 24.

6.2.1.2.2. Example -- Simulation is desired of a one-year (not leap year) length of record, obtaining eight-hour averages as part of the run. NPER will equal 2920 (365 x 3), and NAVG will equal 8. (This example is not very practical if options are selected to obtain printed output, as tremendous amounts will be generated; see 6.2.3.3 and 6.3.2 below.)

6.2.1.3 Pollutant Indicator --

The variable IPOL (See Card Type 4, Section 7) is set on the point source card (Type 7) to either 3 for use of the emission rate in columns 29 to 36, or 4 for use of columns 39 to 44. IPOL is also used to select the proper headings "SO_2" or "PART" on output. The dispersion is treated identically for the two pollutants whose emissions are in the above fields on the point source card. Calculations may be made for pollutants other than sulfur dioxide and particulate matter by substituting their emissions in either above defined field. However, without altering the program, all headings will still read "SO_2" or "PART." Pollutants whose emissions are substituted should be relatively nonreactive, or have a loss rate describable by an exponential loss with time.

6.2.1.4 Number of Significant Sources --

The variable NSIGP is specified primarily to obtain printed information on contributions to the concentration at each receptor from up to 25 individual sources. The value entered is the number of sources for which contributions will be printed for each hour (optional, see 6.2.3.3.3 below) and for each averaging time (again optional, see 6.2.3.3.9 below). The output is printed such that the same number of pages is required for 1 to 10 significant sources; twice this number is required for 11 to 20 significant sources, and three times this number for 21 to 25 sources. Care should thus be exercised to specify only the number of sources that is actually necessary.

6.2.1.5 Fifth Averaging Time for High-Five Concentration Table --

The value of the variable, NAV5, is significant only if the run is lengthy, say, a simulation of five days or more. If the option to produce and write the high-five table is used (see 6.2.3.3.11 below), this value will be the length in hours of an additional averaging time that will be used to list the five highest concentrations over the period of this run. Since high-five tables are already produced for 1-, 3-, 8-, and 24-hour averaging times, none of these values will be used if entered for NAV5. Also, the value entered should be evenly divisible into 24. Only 2, 4, 6, and 12 meet all these criteria. If, then, a need exists for knowing the highest five concentrations for any of these averaging times (2-, 4-, 6-, or 12), enter the proper value; otherwise enter zero.

6.2.1.6 Multiplier Constant -- CONONE

The multiplier constant CONONE is used to convert distances in the user units to distances in kilometers. These units are subsequently used for obtaining dispersion parameters and relating receptors to plume locations. If the user coordinate system is in kilometers, CONONE = 1. If user coordinate system is in miles, CONONE = 1.609344.

6.2.1.7 Multiplier Constant -- CELM

The multiplier constant CELM will convert the user height units to meters. If the elevations are reported in meters, CELM = 1; if the elevations are in feet, CELM = 0.3048. CELM is used only when terrain adjustments are made with Option 1. In this option, heights are entered for both source ground-level elevations and receptor ground-level elevations, in height units convenient to the user.

6.2.1.8 Pollutant Half-Life -- HAFL

An exponential loss of the considered pollutant with travel time is included in the model. At a travel time equal to the half-life, 50% of the pollutant will remain. Although this view of chemical or physical depletion processes is overly simplistic, it may be useful under certain circumstances. Note that the half-life is entered in seconds. If the user wants no depletion to be considered, entering zero for the half-life will cause skipping of those portions of the code calculating pollutant loss.

6.2.1.9 Values of Variables Related to Increase of Wind with Height --

The anemometer height in meters for the meteorological data used is entered on CARD TYPE 6. Six values for the wind profile power law exponent, one for each stability class, are also entered on CARD TYPE 6. In Section 4, values were given from Irwin (1979) consistent with the surface roughness that corresponds to the P-G dispersion parameter values. For computations submitted in response to regulatory requirements, certain values for this parameter may be required; the appropriate EPA regional office should be consulted prior to performing calculations.

If Option 1 is employed to make terrain adjustments, six terrain adjustment factor values (one for each stability class) that are read in on CARD TYPE 6 are used in subsequent computations (see 6.2.3.1.1 below). The values must be real numbers between 0 and 1.

6.2.2 Input Data

Comments on emission, receptor, and meteorological data are made here.

6.2.2.1 Emission Data -- (See CARD TYPE 7)

The alphanumeric name and the eight variables of point source information are the same as used in most dispersion models. Only one of the two emission rates will be used in a given run (see 6.2.1.3 above). If only one pollutant is of interest, the other field may be left blank. If Option 6 to enter hourly emission rates (see 6.2.3.2.2 below) is not used, the emission rates should provide the best estimate of the emission for the length of record being run. If maximum or design emissions are used, concentration estimates may be somewhat larger than actual concentrations. However, Irwin and

Cope (1979) have demonstrated that maximum operating conditions may not necessarily produce the highest modeled concentrations. If the option is exercised to input hourly emissions from a separate file (see 6.2.3.2.2 below), the input emission on each source card can be either average (normal) emission or maximum design, with the exit velocity appropriate for that condition. In MPTER, the hourly emissions input are compared with the emissions initially input on CARD TYPE 7 and that comparison is used to scale the exit velocity upwards if the hourly emission is greater, or downwards if the hourly emission is less.

In MPTER, no provision exists for altering the stack gas temperature. The value entered on the point source card is used throughout, even if hourly emissions are entered. Since Irwin and Cope (1979) have shown that variation in exit temperature is a sensitive parameter for maximum concentration, and if sufficiently detailed information is available for estimating hourly stack gas temperatures, we would recommend alteration of the model to accept hourly stack gas temperature. Along this same line, with at least the pollutant SO_2, a constant scaling does not necessarily exist between emission rate and exit velocity due to changes in sulfur content of the fuel (and also heat content of the fuel). Here again, alteration of the model may be desirable so that the three parameters (emissions, stack gas temperature, and exit velocity) are all entered hourly. Under the present procedure, only emissions are entered hourly; exit temperature is left constant throughout the run, and exit velocity is scaled by emission rate.

If Option 1 for terrain adjustments is employed, the ground-level elevation of each point source is an element of the point source card, CARD TYPE 7, and is input in units chosen as convenient by the user (see 6.2.1.6 above).

6.2.2.2 Receptor Data -- (See CARD TYPES 10, 11, and 12)

If Option 8 is employed (see below), polar coordinate receptor positions are generated internally in MPTER about a specified location for one to five radial distances. Thirty-six receptors are generated for each distance. If all five distances are used, 180 receptors are generated -- the maximum number of receptors allowed in MPTER. Note that the distances (and also the center of the polar coordinate grid) are specified in user units. If Option 8 is employed to generate the polar coordinate receptors and Option 1 is employed to include terrain adjustments, the ground-level elevations of these receptors must be entered using CARD TYPE 11. A separate card is used for each azimuth, with from one to five elevations per card (see 6.2.3.1.1 below).

An alternative method of entering receptors into an MPTER run is to specify receptor locations (again, in user units) on individual cards for each receptor (CARD TYPE 12).

Note that the receptor height above local ground level must be in meters. Although in many applications the height will be zero (receptor at the ground), other situations may occur where determining concentrations above the ground is desirable, such as at plume centerline. Although no restriction on this height exists, careful thought should be given to the assignment of receptor heights far removed from the ground surface. A cautioning statement in subroutine RCP will be generated if both the effective plume height and the receptor height are above the mixing height. This may cause many useless lines of output.

6.2.2.2.1 Receptor ground-level elevation -- Values for this parameter are required only if Option 1 to employ terrain adjustments is used (see 6.2.3.1.1 below). Note that elevations are entered in the user height units. Estimations in MPTER are limited to receptors whose ground-level elevation is lower than the lowest elevation of all the stack tops in the run. If numerous sources and receptors exist, it is not necessarily easy to inspect the input data to see if this criterion is met. A receptor whose elevation is above this low stack top value will not have a concentration estimate calculated; instead, the concentration will be set to an extremely high value that will cause asterisks to appear on the output for this receptor (at least on EPA's UNIVAC 1110). Also, double asterisks will appear beside the receptor numbers in the initial output listing receptors. Single asterisks will appear beside receptor numbers whose elevations are below the ground-level elevation of the source having the highest ground-level elevation. Caution should be used in interpretation of these concentrations.

Users who want to make a run for a significant length of simulated time are thus advised that when employing the terrain adjustment option, they must first make a run for a short period (one hour -- meteorological data are unimportant) to see if double asterisks appear on the receptor list. Then these receptors should be eliminated before making the long-term run.

6.2.2.3 Meteorological Data -- (See CARD TYPE 14)

Meteorological data files prepared by the CRSTER Preprocessor or by the similar program from the RAM system, RAMMET, are acceptable by MPTER. Proper running of these preprocessor programs results in a one-year period of record with one record for each calendar day. Twenty-four values of each of the following parameters are contained in this record: Pasquill-Gifford Stability Class, wind speed (at anemometer height), ambient air temperature, wind flow vector (wind direction ± 180°), and mixing height. The user should be reminded that if using either of these programs to process meteorological data, a complete set of data must be input to either program. Any "holes" in the data set must be filled by the user. In using this data for input to MPTER one record is read for each simulated day. If making a run for a period of record of less than a year and starting after Day 001 (January 1st), MPTER will skip records to arrive at the proper day based upon the variable IDATE(2) on CARD 4 (see 6.2.1.4 above).

If using meteorological data from the preprocessed file, Option 5 will be zero. Also, the four variables on CARD TYPE 8 are to be read in and will be checked against the data on the input file.

Alternatively, when employing Option 5, meteorological data is read from punched cards (see CARD TYPE 14) with one card for each simulated hour in the run. The wind speed on this card again is for the anemometer height. The wind direction is the direction from which the wind blows.

6.2.3 Options

There are four technical options, four input options, 11 print options, and five other options either for control or for output to files. To employ the particular option, a 1 is entered as input to the element of the array IOPT with the same number as the option number. Otherwise, a zero is entered for this variable. Values of 0 or 1 are entered for all options on CARD TYPE 5.

6.2.3.1 Technical Options --

6.2.3.1.1 Option 1: Terrain Adjustment -- Since terrain adjustment is a major feature of this model, this is Option 1. Terrain adjustment is made if the option is employed, that is IOPT(1) = 1. The use of this option requires input of source ground-level elevation on CARD TYPE 7 (see 6.2.2.1 above) and receptor ground-level elevation on CARD TYPE 12 (see 6.2.2.1 above). If Option 8 for generation of polar coordinate receptors is used, CARD TYPE 11 with elevations for the polar coordinate receptors are also read (one card for each of 36 azimuths). Also, this option requires that six terrain adjustment factors, one for each stability class be entered on CARD TYPE 6. These values must be real numbers between zero and one. This allows the model to be used for research with various values. Of note to the user is that if the run results are to be submitted in response to regulatory requirements, certain values may be required for these parameters. If zeros are entered for all six stabilities, this will have the effect of doing the terrain adjustment the same as done by CRSTER. If ones are entered for all six stabilities the concentration estimates will be the same as if terrain is not considered (the option not employed) for 1's will cause the plumes to rise fully over the terrain which is equivalent to elevated plumes over a level surface. Therefore where use of 1's for all stabilities is contemplated, the use of the terrain option is unnecessary.

6.2.3.1.2 Option 2: No Stack Downwash -- With IOPT(2) = 0, stack downwash is used if applicable using the procedure given in Appendix B. With IOPT(2) = 1, stack downwash is not estimated.

6.2.3.1.3 Option 3: No Gradual Plume Rise -- With IOPT(3) = 0, gradual plume rise from stack top to the distance of final rise is determined using the procedures in Appendix B. With IOPT(3) = 1, only the final plume height is used for effective height.

6.2.3.1.4 Option 4: Use Buoyancy-Induced Dispersion -- With IOPT(4) = 0, sources are treated as point sources. With IOPT(4) = 1, buoyancy-induced plume size is determined in both the horizontal and vertical dependent on plume rise using the techniques suggested by Pasquill (see Section 4). It should be pointed out that even if Option 3 is employed, resulting in use of only the final plume height for effective height of emission, the gradual plume rise is determined internally to determine the buoyancy-induced plume size. (It would not be the least bit appropriate to use the final plume rise to determine the initial size close to the stack.)

6.2.3.2 Input Options --

For the four following input options, specific action is taken if the value of 1 is entered.

6.2.3.2.1 Option 5: Met. Data on Cards -- If IOPT(5) = 1, met data are entered on cards with one card for each simulated hour (see 6.2.2.3 above). If option 5 is 0, meteorological data is entered using records on unit 11. The specification of the records on this input file are given in the next section.

6.2.3.2.2 Option 6: Read Hourly Emissions -- If IOPT(6) = 1, hourly emissions for each point source are read from unit 15 in the main program, then are compared with the emissions input on the point source card for scaling the exit velocity (see 6.2.2.1). Subroutine PTR performs these tasks; Section 7 specifies the records on this input file.

6.2.3.2.3 Option 7: Specify Significant Sources -- The number of significant sources, given as NSIGP on Card 4, is ranked when the emissions data are processed according to expected ground-level impact under B stability, with a wind at stack top of 3 m s^{-1}. This option can be employed if the contribution of a source is sought for a subsequent run that is outside this list or too far down it to be included among the significant sources, NSIGP on Card 4 (see 6.2.1.5 above). When IOPT(7) = 1, an additional input card is read (CARD TYPE 9) that indicates how many sources will be specified (NPT), then gives their source numbers (the array MPS) corresponding to the source numbers in the printed output list. Source numbers are assigned according to the order of the source input. For example, consider an application having 30 sources, where a run is deemed useful that shows contributions from 10 sources (NSIGP on CARD 4 will be set to 10). Specifically, the contributions from sources 7 and 22 are desired. The 12 most significant of the 25 sources, in order are: 3, 8, 23, 11, 2, 15, 4, 27, 1, 5, 28, and 14. Since 7 and 22 are not among these 12, and further are not in the first 10, Option 7 is set equal to 1, and CARD TYPE 9 contains 2 for NPT and the two numbers 7 and 22 for the two entries to MPS. Sources 7 and 22 will occupy the first two columns in the contribution table. The program will fill the other eight positions of the significant source list (to total 10) with the first eight sources of the list of 25, i.e., 3, 8, 23, 11, 2, 15, 4 and 27.

6.2.3.2.4 Option 8: Input Radial Distances and Generate Polar Coordinate Receptors -- For the user's convenience in making computations at an array of receptors that are positioned about a specific source or some other point, Option 8 provides for reading an additional input card (CARD TYPE 10) with from one to five non-zero distances in user units. Additionally, the east and north coordinates (also in user units) of a center position are provided. The program generates the east and north coordinates of each receptor in a polar coordinate array, generating 36 receptors for each non-zero distance (one for each 10 degrees of azimuth). A five-value distance array is read from the card with distances entered for the number of distances desired. Zeros are added to fill the array. For example, to produce a receptor array with two distances, two distances and three zeros are entered. This step will generate 72 receptors (36 for each distance). Putting non-zero values for all five distances will generate 180 receptors, which is the maximum number that MPTER can compute. Thus using Option 8 in this manner will not allow the input of any additional receptor cards with positions specified by the user.

Of note to the user is that if both Option 8 and Option 1 for terrain adjustment are used, elevations of the polar coordinate receptors must be read in using CARD TYPE 11. These can best be obtained by drawing 36 radials from the designated center point on a topographical map, and drawing circles for each distance. Then the elevations can be determined from the map by reading elevations outward from the center, starting with the 10-degree azimuth radial. If all five distances are used so that 180 receptors are generated, a card with ENDREC in Columns 1-6 must be read following CARD TYPE 10 (or the last card of CARD TYPE 11 if used).

6.2.3.3 Printed Output Options --

When employed, the eleven printed output options will cause portions of the computer code to be skipped. A normal run will generally use at least some of these options.

6.2.3.3.1 Option 9: Delete Emissions with Height Table -- Option 9 will be left zero only if it is desirable to look at the distribution of physical stack heights of the sources being modeled. This table is printed at the end of Section E in the main program, and is shown in Example 4.

6.2.3.3.2 Option 10: Delete Averaging Time Meteorological Summary -- Option 10 will be left zero when the user desires to obtain a listing of the hourly meteorological data for each simulated averaging time, and the resultant or average conditions for that period. If the run is for a long period of record, such as a year, a similar record more than likely has already been made for the meteorological data. One output page for each averaging time will be required; Section N of the main program prints this table.

6.2.3.3.3 Option 11: Delete Hourly Contributions -- Option 11 will be left zero only when the value of NSIGP on CARD TYPE 4 is one or more, when the user wishes to examine on an hour-by-hour basis the contributions to the receptor concentrations of significant sources. If IOPT(11) = 1, Sections B, C, D, and E of Subroutine OUTHR are skipped.

6.2.3.3.4 Option 12: Delete Meteorological Data on Hourly Contributions -- Option 12 will be left zero only when the meteorological data for the hour should be listed with the contribution (see Example 2). If IOPT(12) = 1, Section C in Subroutine OUTHR is skipped.

6.2.3.3.5 Option 13: Delete Final Plume Height and Distance to Final Rise on Hourly Contributions -- Option 13 will be left zero only when the hourly calculated final plume height and the distance to final rise is desired with the hourly contributions. Information on effective plume height of specific sources can be invaluable in trying to determine distance to maximum concentrations, or in trying to arrange receptors vertically. If IOPT(13) = 1, Section D in Subroutine OUTHR is skipped.

6.2.3.3.6 Option 14: Delete Hourly Summary -- Option 14 will be left zero when it is desirable to have the hourly summary printed for each hour in the run. The hourly summary contains the sum of the contributions to the concentration at each receptor. In addition to this sum, two components of the concentration are given: that due to all significant sources, and that due to all other sources, (i.e., those not considered in the sources selected as significant for this run). If IOPT(14) = 1, Sections F, G, H, and I in Subroutine OUTHR are skipped.

6.2.3.3.7 Option 15: Delete Meteorological Data on Hourly Summary -- Option 15 will be left zero when the meteorological data are required for the hour printed with the hourly summary. This information is the same as discussed in 6.2.3.3.4 above, Option 12. Seldom should the meteorological data be needed on both of these outputs. If IOPT(15) = 1, Section G in Subroutine OUTHR is skipped.

6.2.3.3.8 Option 16: Delete Final Plume Height and Distance to Final Rise on Hourly Summary -- Option 16 will be left zero when the final plume height and distance to final rise are needed on the hourly summary. This information is the same as on the contributions (see 6.2.3.3.5 above), and should not be needed on both outputs. If IOPT(16) = 1, Section H in Subroutine OUTHR is skipped.

6.2.3.3.9 Option 17: Delete Averaging-Time Contributions -- Option 17 will be left zero when examination of the contributions from the significant sources is desired for each averaging time. If IOTP(17) = 1, Section J in Subroutine OUTHR is skipped.

6.2.3.3.10 Option 18: Delete Averaging-Time Summary -- Option 18 will be left zero when printout of the averaging-time summary is needed. This table is similar to the hourly summary (see 6.2.3.3.6 above), except for the simulation period covered. If averaging over these hours would be meaningless due to a run being made for a number of independent hourly periods, Options 17 and 18 should both be set to 1. If IOPT(18) = 1, Section K in Subroutine OUTHR is skipped.

6.2.3.3.11 Option 19: Delete Average Concentrations and High-Five Table -- Option 19 will be left zero in order to produce average concentrations for the duration of the run and to list the five highest concentrations for four or five averaging times. (See discussion concerning the variable NAV5 in 6.2.1.5 above.) For this table to be useful, at least two periods of the concentration averaging period should be run. Any run less than 5 days will have some zeros in the output table, since one output will be the highest five concentrations for the 24-hour averaging time. If IOPT(19) = 1, Sections Q and S in MPTER will be skipped.

6.2.3.4 Other Control and Output Options --

The five other control and output options cause portions of the code to be executed only if the option is employed.

6.2.3.4.1 Option 20: Run as Part of a Segmented Long Run -- Option 20 is used to segment a run into several pieces. CARD TYPE 13 is read and appropriate input and output files are set to the correct record. Also, data for the average concentration and high-five are read from the previous segment and written for the next segment using unit 14.

To properly break a large run into segments, the number of averaging periods, NPER on CARD 4, should be set to the total number for the sum of the segments. This step will allow the variable LDRUN, from CARD TYPE 13, to control the program flow and temporarily store the proper data on unit 14. For example, to break a one-year run into two segments, let NPER equal 366, and NAVG equal 24 for both segments. On Card 13 for the first segment, IDAY is zero and LDRUN can be 180; for the second segment, IDAY is 180 and LDRUN is 366 (for a leap year). The proper date and time should be entered on Card 4 for each run.

6.2.3.4.2 Option 21: Write Partial Concentrations to Disk -- Option 21 provides for all concentration contributions from each source to each receptor for each hour using unit 10. One record is written in Section PTR.F for each receptor for each hour; thus a large number of records will be written even for a relatively short length of simulated period. The specifications for these records are given in Section 7. The user should proceed with knowledge of the amount of data generated before using this option.

6.2.3.4.3 Option 22: Write Hourly Concentrations to Disk -- Option 22 provides for writing a record once each hour on unit 12 containing the concentration for each receptor. This option is written at the end of Section P of MPTER. The specifications for these records are given in Section 7.

6.2.3.4.4 Option 23: Write Average Concentrations to Disk -- Option 23 provides for writing a record once each averaging period on unit 13, containing the concentration for each receptor. This option is written at the end of Section OUTHR.K; specifications for these records are given in Section 7.

6.2.3.4.5 Option 24: Punch Average Concentrations on Cards -- Option 24 provides for punching cards at the end of each averaging period of the concentration for each receptor for the averaging time (one card per receptor). Unit 1 is used for punching. The format for these output cards is given in Section 7.

6.3 RUNNING COSTS AND OUTPUT VOLUME

6.3.1 Running Costs

The examples to be shown in Section 8 will give the user some idea of running costs. Below are examples of time and costs for runs on EPA's UNIVAC 1110.

Example 1	1.178^s	8¢
Example 2	1.497^s - 1.510^s each	10 - 11¢
Example 3	16^m 44.674^s	$61.19
Example 4	9.127^s	61¢

Running costs are proportional to the number of hours simulated, the number of sources, and the number of receptors. Since computations are made for each source-receptor pair, running time will increase somewhat according to: (sources) x (receptors).

6.3.2 Output Volume

Depending on the options employed, MPTER is capable of generating a tremendous quantity of printed output. The output will be at a maximum unless deletions are made using options 9 to 19. Table 3 will assist the user in estimating the amount of output.

TABLE 3. MPTER OUTPUT VOLUME

Output	No. of lines	No. of pages
Mandatory Output on All Runs		3 - 6
Emissions with Height Table		1/2
Met. Data for Avg. Period		1
Met. Data on Hourly Contributions or Hourly Summaries	5	
Final Plume Rise and Distance to Final Rise		
less than 10 sources	3	
250 sources	51	
(1 line plus two lines for each 10 sources or fraction of 10 sources)		
Hourly Contributions (for each hour)		
for 1 to 10 significant sources		
about 30 receptors		1
about 31 to 83 receptors		2
about 84 to 136 receptors		3
about 137 to 180 receptors		4
for 11 to 20 significant sources	twice that for 1 to 10	
for 21 to 25 significant sources	three times that for 1 to 10	
Hourly Summaries (for each hour)		
(See above for number of lines to add for met. data and for plume data.)		
about 45 receptors		1
about 46 to 98 receptors		2
about 99 to 151 receptors		3
about 152 to 180 receptors		4
Averaging Period Contributions (for each period)		
for 1 to 10 significant sources		
46 receptors		1
47 to 99 receptors		2
100 to 152 receptors		3
153 to 180 receptors		4
for 11 to 20 significant sources	twice that for 1 to 10	
for 20 to 25 significant sources	three times that for 1 to 10	
Averaging Period Summary (for each period)		
44 receptors		1
45 to 78 receptors		2
99 to 151 receptors		3
152 to 180 receptors		4
Average Concentrations and High-Five Table		
for 180 receptors		17
(Proportionately less for less than 180 receptors.)		

Consider the following example run and the estimate of maximum output. Five averaging periods of 24 hours each are to be simulated, using 250 sources and 180 receptors (both of these are maximum values). The number of significant sources is 25, also the maximum. Table 4 gives an estimate of the number of pages of output.

TABLE 4. MAXIMUM OUTPUT: 5-DAY RUN FOR 250 SOURCES AND 180 RECEPTORS.

Output	No. of Pages
Mandatory output (because of number of sources and receptors)	11
Emissions with Height Table (1/2 page, included above)	
Met. Data Summary for Avg. Period	5
Hourly Contributions with Met. Data and Plume Height Info. (an additional page is added because of 51 lines of plume info.) 13 pages x 5 periods x 24 hours =	1560
Hourly Summaries, 4 pages x 5 periods x 24 hours =	480
Averaging Period Contributions, 12 pages x 5 periods =	60
Averaging Period Summaries, 4 pages x 5 periods =	20
High-Five Table	17
Total	2153

Obviously most users will want to delete much of this output. Considering that the above proposed run is only of 5 days duration, the user must be very generous in the use of options to delete unneeded output.

6.4 ERROR MESSAGES AND REMEDIAL ACTION

Fourteen error messages can be generated by MPTER. Each of these will terminate program execution with STOP.

6.4.1 Error Message 1

The first error message occurs if the user specifies the number of sources to be significant as more than 25 on CARD 4. The following error message is printed:

```
NSIGP (THE NO. OF SIGNF POINT SOURCES) WAS FOUND TO EXCEED
THE LIMIT (25).  USER TRIED TO INPUT xxx SOURCES *********
EXECUTION TERMINATED **********
```

where xxx is the value put on CARD 4 for the variable NSIGP.

The corrective action is to change the value of NSIGP on CARD 4 to a value of 25 or less.

6.4.2 Error Message 2

The second error message occurs for situations using Option 1. If any of the six values of the terrain adjustment factor are outside the acceptable range of between 0. and 1., the following error message is printed:

```
CONTER VALUE IS OUTSIDE OF RANGE:  ZERO TO ONE.  EXECUTION
TERMINATED.
```

The corrective action is to change the offending value(s) of CONTER (input values that were entered on Card 6 are printed prior to the error statement).

6.4.3 Error Message 3

The third error message occurs if the user attempts to input more than the maximum number of point sources (250), or forgets to place an 'ENDPOINT' card following the last point source. The following error message is printed:

```
USER TRIED TO INPUT MORE THAN 250 POINT SOURCES.  THIS GOES
BEYOND THE CURRENT PROGRAM DIMENSIONS.
```

The corrective action is to reduce the number of sources to 250 and/or to put the 'ENDPOINT' card behind the 250th source.

6.4.4 Error Message 4

The fourth error message is printed if no sources were specified:

```
NPT = xxx I.E., EQUAL OR LESS THAN ZERO RUN TERMINATED ----
CHECK INPUT DATA
```

where xxx will be zero.

The corrective action is to revise the run stream so that it includes data for at least one point source.

6.4.5 Error Message 5

The fifth error message is written when Option 7 is employed by the user to specify numbers of sources he wants to be considered as significant, but he specifies a number larger than the number of significant sources allowed for the run (NSIGP). The following error message is printed:

```
***ERROR --- USER TRIED TO SPECIFY xxx SIGNIFICANT SOURCES,
BUT IS ONLY ALLOWING yyy TOTAL SIGNIFICANT SOURCES IN THIS RUN.
*** RUN TERMINATED - CHECK INPUT DATA! ***
```

where xxx is the value of INPT from CARD TYPE 8 and yyy is the value of NSIGP from CARD 4.

The corrective action is to increase NSIGP (not to exceed 25) or to decrease the value of INPT to equal or less than NSIGP, and to eliminate all but that number (INPT) of sources on CARD TYPE 8 following the value of INPT.

6.4.6 Error Message 6

The sixth error message is written when Option 5 is zero, requiring meteorological data to be read from a tape or disk file. If the surface station identification and the year read from CARD TYPE 9 do not match those given in the first record on the file, the following error message is printed:

```
SURFACE DATA IDENTIFIERS READ INTO MODEL (STATION = xxxxx, YEAR = yy)
DO NOT AGREE WITH THE PREPROCESSOR OUTPUT FILE (STATION = wwwww,
YEAR = zz)
```

where xxxxx and yy are read in on CARD TYPE 9, and wwwww and zz are from the file.

Corrective action is to substitute the proper desired file or to change the identifiers on the card to match the data. The user should be careful to use the most representative meteorological data available.

6.4.7 Error Message 7

The seventh error message is similar to message six, occurring when meteorological data are read from a file when Option 5 is zero. If the upper air station identification for the station used to calculate mixing height and the year read from CARD TYPE 9 do not match those given in the first record on the file, the following error message is printed:

```
MIXING HEIGHT IDENTIFIERS READ INTO MODEL (STATION = xxxxx,
YEAR = yy) DO NOT AGREE WITH THE PREPROCESSOR OUTPUT FILE
(STATION = wwwww, YEAR = zz)
```

Corrective action is to substitute the proper desired file or to change the identifiers on the card to match the data. The user should be careful to use the most representative meteorological data available.

6.4.8 Error Message 8

The eighth error message occurs if both Option 1 for terrain and Option 8 to generate receptors equal 1 and the 36 elevation cards (TYPE 11) are out of sequence, or have been punched incorrectly. If the numbers 1 through 36 on the cards do not match the internally generated numbers 1 through 36, the following message is printed:

```
WRONG RECEPTOR ELEVATION CARD READ.  READ CARD FOR AZIMUTH
xxx SHOULD HAVE BEEN yyy.
```

The corrective action is to check the sequencing and formatting of all TYPE 11 cards and to correct any errors.

6.4.9 Error Message 9

The ninth error message occurs if the user attempts to enter more than 180 receptors or failed to place an 'ENDREC' card after the 180th receptor was generated or read. In other words, the user failed to put this card behind the last TYPE 11 card if 180 polar coordinate receptors were generated, or behind the CARD TYPE 12 which generates the 180th receptor. The following message is printed:

```
**** USER EITHER TRIED TO INPUT MORE THAN 180 RECEPTORS OR
ENDREC WAS NOT PLACED AFTER THE LAST RECEPTOR CARD **** ********
EXECUTION TERMINATED *******
```

The corrective action is to reduce the number of receptors to no more than 180 and to place an ENDREC card at the proper place.

6.4.10 Error Message 10

The tenth error message occurs if no receptors have been generated or read in:

```
NO RECEPTORS HAVE BEEN CHOSEN
```

The corrective action is to restructure the input runstream so that receptors are generated or read.

6.4.11 Error Message 11

The eleventh error message occurs if Option 20 to segment a run is used, and in the second or greater segment of such a run, the number of days previously processed (IDAY, read from CARD TYPE 13) does not match the number of days written to an external file after processing. The following message is printed:

```
*** DAYS DO NOT MATCH, IDAY = xxx, IDAYS = yyyy
```

The corrective action is to replace CARD TYPE 13 with the proper value of IDAY to match the information from the previous run.

6.4.12 Error Message 12

The twelth error message occurs if Option 5 is zero, requiring meteorological data to be read from a file. If either the year or Julian day in the program execution does not match the year or day on the record on the meteorological data, the following message is printed:

```
DATE ON MET. TAPE, yyddd, DOES NOT MATCH INTERNAL DATE,
wwzzz
```

where yyddd are the year and day from the meteorological file and wwzzz are the year and day generated in the execution of the program.

The corrective action is to determine the cause and correct the runstream, or the meteorological file, or both.

6.4.13 Error Message 13

The thirteenth error message occurs if a value for the start hour of a period becomes zero or negative. The following message is printed:

```
HOUR xxx IS NOT PERMITTED.  HOURS MUST BE DEFINED BETWEEN
1 and 24
```

where xxx is the value of IHSTRT.

The corrective action is to check the value of IHSTRT in CARD 4.

6.4.14 Error Message 14

The fourteenth error message occurs using Option 6 to read hourly emissions. If the combined year, Julian day and hour from the internal execution of the program do not match the similar date time group from the file, the following message is printed.

```
DATE BEING PROCESSED IS = byydddhr DATE OF HOURLY POINT EMISSION
RECORD IS = bxxeeeff *** PLEASE CHECK EMISSION RECORDS***
```

The corrective action is to check the emission records or determine the reason why the internal date is in error.

SECTION 7

INPUT CARD, INPUT FILE, AND OUTPUT FILE SPECIFICATIONS

CARD INPUT

Tables 5 through 16 list the card input necessary to execute MPTER. Since some card types are read in UNIVAC's free format, individual values on a card must be separated either by a comma or a space. Up to 250 point sources and 180 receptor cards are allowed; more than this number will result in runstream termination. Meteorology data can be input on cards or through a preprocessed file of the same type used for RAM and CRSTER. Hourly emissions can also be read in as an option.

The ordering of the cards in the input deck is shown in Figure 3. The systems flow for MPTER is shown in Figure 4.

TABLE 5. MPTER CARD TYPE 1, 2, and 3 - TITLE (3 cards)

Variable	Format	Description	Units
LINE1	20A4	80 alphanumeric characters for heading	-
LINE2	20A4	80 alphanumeric characters for heading	-
LINE3	20A4	80 alphanumeric characters for heading	-

TABLE 6. MPTER CARD 4 - CONTROL AND CONSTANTS (1 card)

Variable	Format	Description	Units
IDATE(1)	Free	2 digit year (see 6.2.1.4)	-
IDATE(2)	Format	starting Julian day for this run	-
IHSTRT		starting hour for this run	-
NPER		number of averaging periods to be run (see 6.2.1.2)	-
NAVG		number of hrs in an averaging period	-
IPOL		pollutant indicator: 3 = SO_2 4 = Suspended Particulates (see 6.2.1.1)	-
NSIGP		number of significant point sources, max = 25. (see 6.2.1.5)	-
NAV5		number of hrs in the user specified period for which a high-five concentration table is generated. (see 6.2.1.3)	-
CONONE		multiplier constant, user units to km (see 6.2.1.5)	-
CELM		multiplier constant, user ht units to m (see 6.2.1.6)	-
HAFL		pollutant half-life (see 6.2.1.7)	seconds

TABLE 7. MPTER CARD 5 - OPTIONS (1 card) - integer values: 0 or 1

Variable	Format	Description
		TECHNICAL OPTIONS (see 6.2.3.1)
IOPT(1)	Free Format	Use Terrain Adjustments
IOPT(2)		No Stack Downwash
IOPT(3)		No Gradual Plume Rise
IOPT(4)		Include Buoyancy Induced Dispersion
		INPUT OPTIONS (see 6.2.3.2)
IOPT(5)		Met. Data on Cards
IOPT(6)		Read Hourly Emissions
IOPT(7)		Specify Significant Sources
IOPT(8)		Input Radial Distances and Generate Polar Coordinate Receptors
		PRINTED OUTPUT OPTIONS (see 6.2.3.3)
IOPT(9)		Delete Emissions With Height Table
IOPT(10)		Delete Resultant Met. Data Summary for Averaging Period
IOPT(11)		Delete Hourly Contributions
IOPT(12)		Delete Met. Data on Hourly Contributions
IOPT(13)		Delete Final Plume Height and Distance to Final Rise on Hourly Contributions
IOPT(14)		Delete Hourly Summary
IOPT(15)		Delete Met. Data on Hourly Summary
IOPT(16)		Delete Final Plume Height and Distance to Final Rise on Hourly Summary
IOPT(17)		Delete Averaging-Period Contributions
IOPT(18)		Delete Averaging-Period Summary
IOPT(19)		Delete Average Concentrations and High-Five Table
		OTHER CONTROL AND OUTPUT OPTIONS (see 6.2.3.4)
IOPT(20)		Run is Part of a Segmented Run
IOPT(21)		Write Partial Concentrations to Disk or Tape
IOPT(22)		Write Hourly Concentrations to Disk or Tape
IOPT(23)		Write Averaging Period Concentrations to Disk or Tape
IOPT(24)		Punch Averaging Period Concentrations on Cards

TABLE 8. MPTER CARD 6 - WIND AND TERRAIN (1 card)

Variable	Format	Description	Units
HANE	Free	anemometer height	meters
PL(I),I=1,6	Format	wind increase with height exponents for each stability class (see 6.2.1.8)	-
CONTER(I),I=1,6		terrain adjustment factors for each stability class (real numbers from 0 to 1)	-

TABLE 9. MPTER CARD TYPE 7 - POINT SOURCE* (up to 250 cards) (see 6.2.2.1)

Variable	Format	Description	Units
RNAME	2A6	12 alphanumeric characters for source identification	-
SOURCE(1,NPT)	F8.2	east coordinate of point source	user units
SOURCE(2,NPT)	F8.2	north coordinate of point source	user units
SOURCE(3,NPT)	F8.2	sulfur dioxide emission rate	$g\ s^{-1}$
SOURCE(4,NPT)	F8.2	particulate emission rate	$g\ s^{-1}$
SOURCE(5,NPT)	F8.2	physical stack height	meters
SOURCE(6,NPT)	F8.2	stack gas temperature	Kelvin
SOURCE(7,NPT)	F8.2	stack inside diameter	meters
SOURCE(8,NPT)	F8.2	stack gas exit velocity	$m\ s^{-1}$
ELP(NPT)	F4.0	source ground-level elevation	user ht units

*Card with ENDPOINTS in columns 1-9 is read in after the last point source card.

TABLE 10. MPTER CARD TYPE 8 - MET. DATA IDENTIFIERS (used with option 5 = 0)

Variable	Format	Description	Units
ISFCD	Free	sfc met station identifier	5 digits
ISFCYR	Format	year of sfc met data	2 digits
IMXD		upper-air station identifier	5 digits
IMXYR		year of mixing-height data	2 digits

TABLE 11. MPTER CARD TYPE 9 - SPECIFIED SIGNIFICANT SOURCES (1 card) (used with option 7 = 1)

Variable	Format	Description	Units
NPT	I3	number of user specified significant point sources	-
MPS	25I3	point source numbers user wants to be considered significant	-

TABLE 12. MPTER CARD TYPE 10 - POLAR COORDINATE RECEPTORS (1 card) (used with option 8 = 1)

Variable	Format	Description	Units
RADIL(I),I=1,5	5F4.0	up to five radial distances which each generate 36 receptors around points CENTX, CENTY on azimuths 10 to 360 degrees	user units
CENTX	F8.3	east coordinate about which radials are centered	user units
CENTY	F8.3	north coordinate about which radials are centered	user units

TABLE 13. MPTER CARD TYPE 11 - POLAR COORDINATE RECEPTOR ELEVATIONS (36 cards) (used if options 1 and 8 are both 1)

Variable	Format	Description	Units
IDUM	I2	azimuth indicator (1 to 36)	-
	8X	(8 blank columns)	
ELRDUM	5F10.0	receptor ground-level elevations for this azimuth for up to five distances	user ht units

TABLE 14. MPTER CARD TYPE 12 - RECEPTOR* (up to 180 cards) (see 6.2.2.2)

Variable	Format	Description	Units
RNAME	2A4	8 alphanumeric characters for station identification	-
RREC	F10.3	east coordinate of receptor	user units
SREC	F10.3	north coordinate of receptor	user units
ZR	F10.0	receptor height above local ground-level	meters
ELR	F10.0	receptor ground-level elevation (see 6.2.2.2.1)	user ht units

*Card with ENDREC in columns 1-6 should follow the last receptor card (a maximum of 180 receptors are allowed input to MPTER for both those generated by option 8 and those entered on card type 12.)

TABLE 15. MPTER CARD TYPE 13 - SEGMENTED RUN (1 card) (used with option 20 = 1)

Variable	Format	Description	Units
IDAY	Free	number of days already processed	-
LDRUN	Format	last day to be processed in this run	-

TABLE 16. MPTER CARD TYPE 14 - METEOROLOGY (see 6.2.2.3)
(used with option 5 = 1)

Variable	Format	Description	Units
JYR	Free	year of met data	2 digits
DAY1	Format	Julian day of met data	3 digits
JHR		hour of met data	2 digits
IKST		stability class for this hour	-
QU		wind speed for this hour	$m\ s^{-1}$
QTEMP		ambient air temperature for this hour	Kelvin
QTHETA		wind direction for this hour	degrees azimuth
QHL		mixing height for this hour	meters

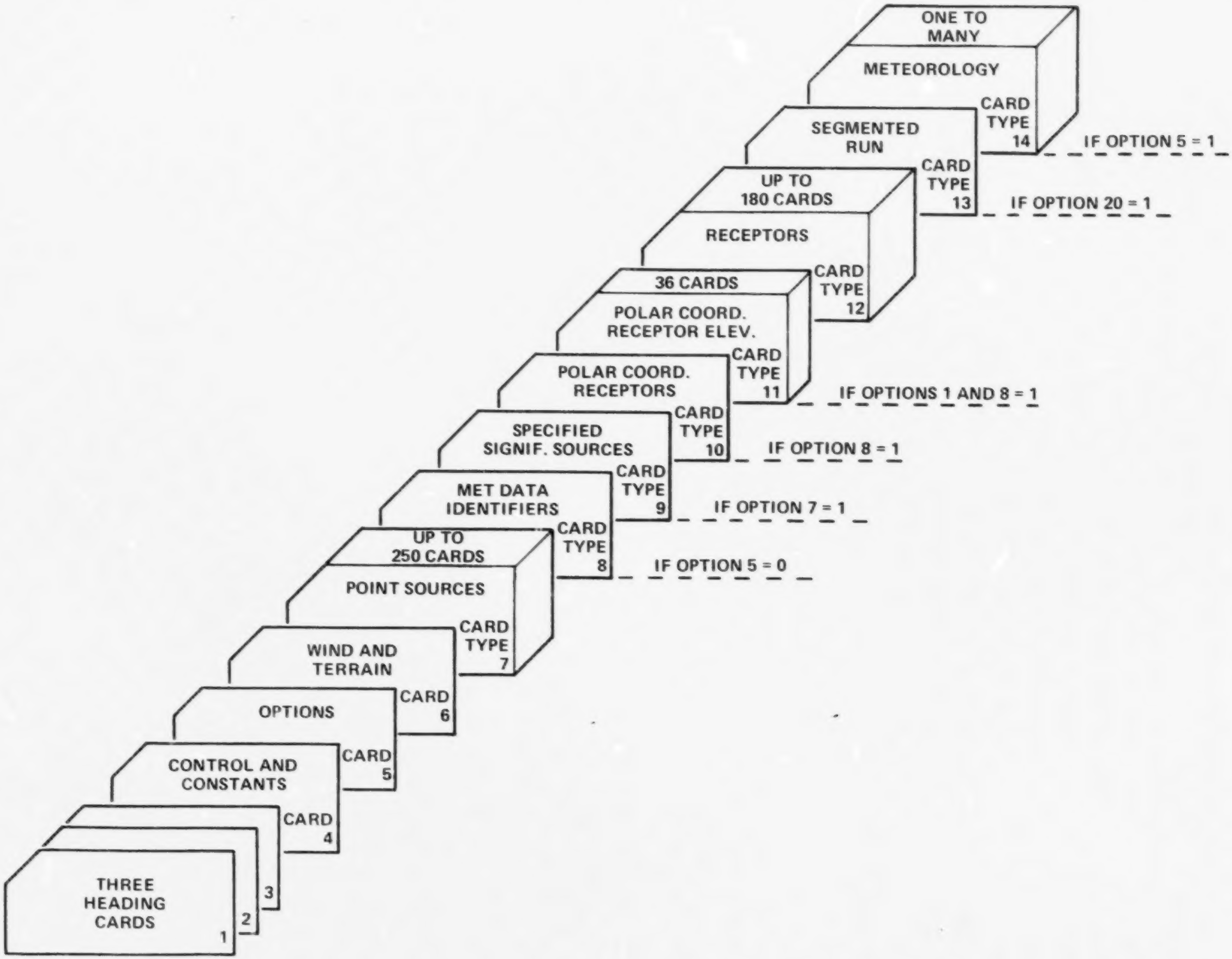
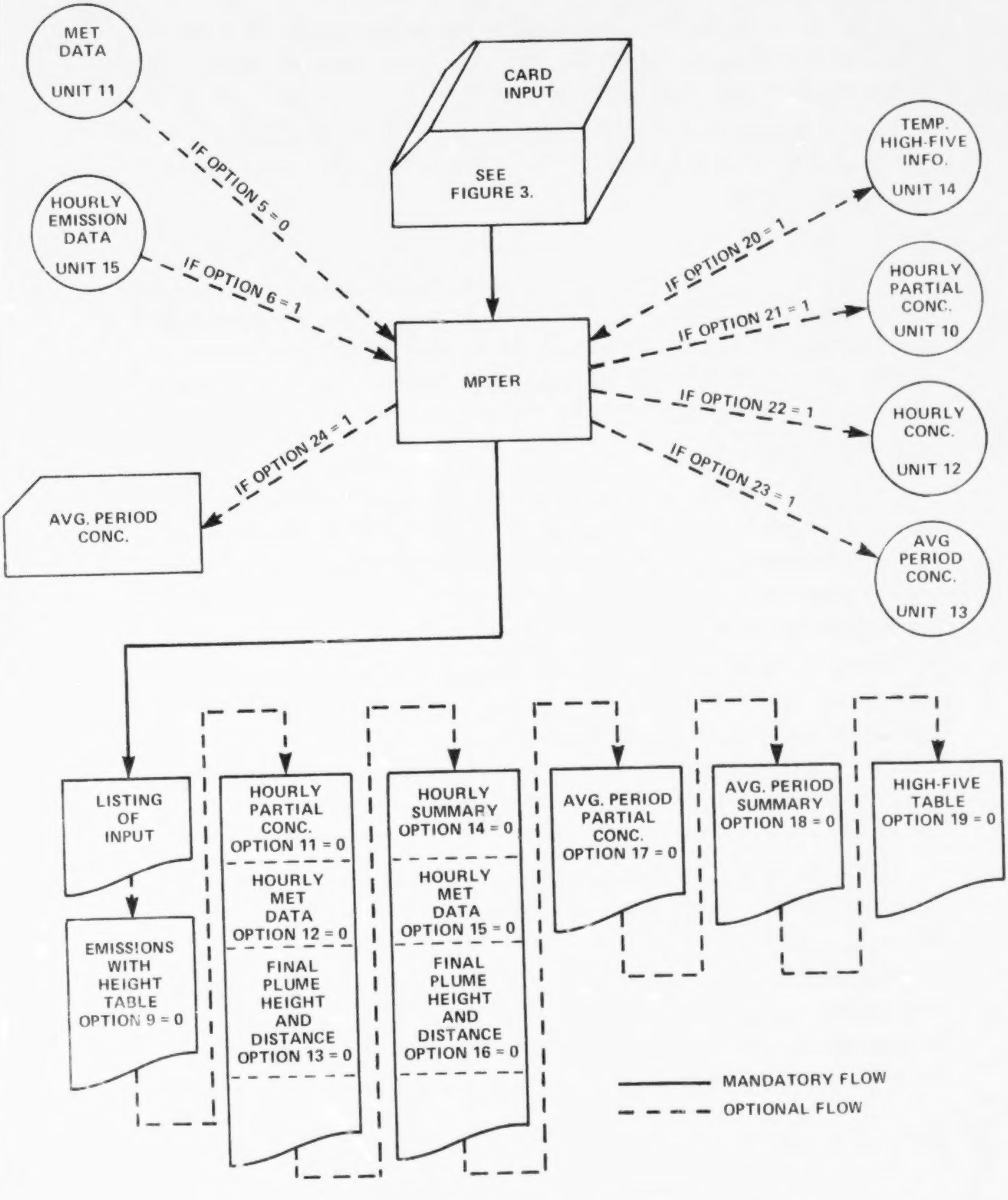

ONE TO MANY
METEOROLOGY
CARD TYPE 14
IF OPTION 5 = 1
SEGMENTED RUN
CARD TYPE 13
IF OPTION 20 = 1
UP TO 180 CARDS
RECEPTORS
CARD TYPE 12
36 CARDS
POLAR COORD. RECEPTOR ELEV.
CARD TYPE 11
IF OPTIONS 1 AND 8 = 1
POLAR COORD. RECEPTORS
CARD TYPE 10
IF OPTION 8 = 1
SPECIFIED SIGNIF. SOURCES
CARD TYPE 9
IF OPTION 7 = 1
MET DATA IDENTIFIERS
CARD TYPE 8
IF OPTION 5 = 0
UP TO 250 CARDS
POINT SOURCES
CARD TYPE 7
WIND AND TERRAIN
CARD 6
OPTIONS
CARD 5
CONTROL AND CONSTANTS
CARD 4
THREE HEADING CARDS
1
2
3

Figure 3. Input data deck setup for MPTER.



MET DATA UNIT 11
IF OPTION 5 = 0
HOURLY EMISSION DATA UNIT 15
IF OPTION 6 = 1
CARD INPUT
SEE FIGURE 3.
TEMP. HIGH-FIVE INFO. UNIT 14
IF OPTION 20 = 1
HOURLY PARTIAL CONC. UNIT 10
IF OPTION 21 = 1
MPTER
IF OPTION 22 = 1
HOURLY CONC. UNIT 12
IF OPTION 23 = 1
AVG PERIOD CONC. UNIT 13
IF OPTION 24 = 1
AVG. PERIOD CONC.
LISTING OF INPUT
EMISSIONS WITH HEIGHT TABLE OPTION 9 = 0
HOURLY PARTIAL CONC. OPTION 11 = 0
HOURLY MET DATA OPTION 12 = 0
FINAL PLUME HEIGHT AND DISTANCE OPTION 13 = 0
HOURLY SUMMARY OPTION 14 = 0
HOURLY MET DATA OPTION 15 = 0
FINAL PLUME HEIGHT AND DISTANCE OPTION 16 = 0
AVG. PERIOD PARTIAL CONC. OPTION 17 = 0
AVG. PERIOD SUMMARY OPTION 18 = 0
HIGH-FIVE TABLE OPTION 19 = 0
MANDATORY FLOW
OPTIONAL FLOW

Figure 4. System flow for MPTER.

FILE INPUT

Table 17 shows the file structure for the meteorological data that is read from unit 11 if option 5 = 0. This file is unformatted and normally is obtained as output from RAMMET or the CRSTER preprocessor.

Table 18 shows the file structure for the emission data that is read from unit 15 if option 6 = 1. This file is unformatted and must be generated by the user.

CARD OUTPUT

Table 19 shows the card format of punched cards containing concentrations for each receptor for each averaging period. These are punched on unit 1 if option 24 = 1. These cards can be used as input to special purpose programs, such as plotter programs to contour the field of concentrations.

FILE OUTPUT

Table 20 shows the file structure for the partial concentrations that are written on unit 10 if option 21 =1; this file is unformatted. Output can become quite lengthy because so much information is available, so care should be exercised to ensure the allocated storage space can accommodate the amount of data generated.

Table 21 shows the file structure for the hourly concentrations that are written on unit 12 if option 22 = 1. This file is unformatted. These data can be quite useful when processed to both give average concentrations over any selected averaging time, and determine highest and second highest concentrations of these over the length of record. The processing of this file must be accomplished by user-devised programs.

Table 22 shows the file structure of the averaging-period concentrations that are written on unit 13 if option 23 = 1. This file is unformatted.

Table 23 shows the file structure of information related to high-five tables that are written on unit 14 if option 20 = 1, i.e., if a run is segmented. This file is unformatted and is read in upon execution of the next segment of the run.

TABLE 17. MPTER OPTIONAL INPUT FILE - METEOROLOGICAL DATA (Unit 11) (input if option 5 = 0)

Variable	Dimensions	Description	Units
RECORD 1			
ID		sfc station identifier	5 digits
IYEAR		year of surface data	2 digits
IDM		mix ht station identifier	5 digits
IYR		year of mix ht data	2 digits
RECORD TYPE 2 (one for each day of year)			
JYR		year	
IMO		month	
DAY1		Julian day	
IKST	24	stability class	
QU	24	wind speed	$m\ s^{-1}$
QTEMP	24	ambient air temperature	K
DUMR	24	flow vector to 10^0	deg-azimuth
QTHETA	24	randomized flow vector	deg-azimuth
HLH	2,24	mixing ht	m

TABLE 18. MPTER OPTIONAL INPUT FILE - EMISSION DATA (Unit 15)
(input if option 6 = 1)

Variable	Dimensions	Description	Units
RECORD TYPE 1 (one for each hour of simulation)			
IDATP	-	date-time indicator consisting of:	
		year	2 digits
		Julian day	3 digits
		hour	2 digits
SOURCE(IPOL, I), I = 1, NPT		Emission rate for the pollutant IPOL for each source	$g\ s^{-1}$

TABLE 19. MPTER OPTIONAL OUTPUT PUNCHED CARDS - AVERAGE CONCENTRATIONS
(Unit 1) (punched if option 24 = 1)

Variable	Card Columns	Description	Units
CARD TYPE 1 (One for each receptor for each averaging time)			
	1-4	word CNTL punched	
	5	blank	
RREC	6-15	east coordinate of receptor	user units
SREC	16-25	north coordinate of receptor	user units
GWU	26-35	concentration for averaging time	$\mu g m^{-3}$
	36-45	blank	
K	46-50	receptor number	-
ZR	51-60	receptor height above ground	m
ELR	61-70	receptor ground-level elevation	user height units
IDATE(1)	72,73	year	-
IDATE(2)	75-77	Julian day	-
NB	79,80	beginning hour of this period	-

TABLE 20. MPTER OPTIONAL OUTPUT FILE - PARTIAL CONCENTRATIONS (Unit 10) (output if option 21 = 1)

Variable	Dimensions	Description	Units
RECORD 1	(from main program)		
NRECEP		number of receptors	-
NPT		number of sources	-
RREC(I), I = 1, NRECEP		east coordinate of receptor	user units
SREC(I), I = 1, NRECEP		north coordinate of receptor	user units
RECORD TYPE 2	(one record for each receptor for each simulated hour, from PTR)		
IDATE		year and Julian day	-
LH		hour	
K		receptor number	
PARTC(J), J = 1, NPT		concentration at receptor K from source J	g m^{-3}

TABLE 21. MPTER OPTIONAL OUTPUT FILE - HOURLY CONCENTRATIONS (Unit 12) (output if option 22 = 1)

Variable	Dimensions	Description	Units
RECORD 1			
NPER		number of periods	-
NAVG		number of hours in averaging period	-
LINE1	14	80 alphanumeric characters for title	-
LINE2	14	80 alphanumeric characters for title	-
LINE3	14	80 alphanumeric characters for title	-
RECORD 2			
NRECEP		number of receptors	-
RREC(I), I = 1, NRECEP		east coordinate of receptor	user units
SREC(I), I = 1, NRECEP		north coordinate of receptor	user units
RECORD TYPE 3 (one for each simulated hour)			
IDATE(2)		Julian Day	
LH		hour	
PHCHI(I), I = 1, NRECEP		hourly concentration for each receptor	g m^{-3}

TABLE 22. MPTER OPTIONAL OUTPUT FILE - AVERAGING-PERIOD CONCENTRTIONS (Unit 13) (output if option 23 = 1)

Variable	Dimensions	Description	Units
RECORD 1			
NPER		number of periods	-
NAVG		number of hours in averaging period	-
LINE1	14	80 alphanumeric characters for title	-
LINE2	14	80 alphanumeric characters for title	-
LINE3	14	80 alphanumeric characters for title	-
RECORD 2			
NRECEP		number of receptors	
RREC(I), I = 1, NRECEP		east coordinate of receptor	user units
SREC(I), I = 1, NRECEP		north coordinate of receptor	user units
RECORD TYPE 3 (one for each simulated averaging period)			
IDATE(2)		Julian Day	
NB		ending hour of period	
PCHI(K), K = 1, NRECEP		averaging period concentration for each receptor	$g\ m^{-3}$

TABLE 23. MPTER OPTIONAL TEMPORARY FILE - VALUES FOR HIGH-FIVE TABLES (Unit 14) (output if option 20 = 1)

Variable	Dimensions	Description	Units
ONLY RECORD			
IDAY (on write)		number of days processed	
IDAYS (on read)		number of days previously processed	-
SUM	180	cumulation of long-term concentration	
NHR		number of hours processed	-
DAY1A		Julian day number of start of period of record	
HR1		start hour of period of record	-
HMAXA	3,5,180,5	Highest five concentrations (g m^{-3}), and associated day and hour, for each receptor, for five different averaging times	-

SECTION 8

EXAMPLE PROBLEMS

Four problems have been chosen to demonstrate some of the uses of MPTER and to also show the various types of output.

EXAMPLE ONE

The first problem concerns one source for a single one-hour period. The option to adjust for terrain is selected. Receptors are input so that five receptors are stacked vertically above each of four downwind positions. When using the terrain adjustment, MPTER is limited to making concentration estimates at receptors whose ground-level elevation is no higher than that of the lowest source stack top. The user tries to apply the model for a situation outside this restriction.

Receptors 16 through 20 all have a ground-level elevation of 10 meters higher than the stack top. Encountering this situation, the model sets the concentration to a number too large to be printed in the format allocated for the concentration. Asterisks thus appear on the output, signifying that no estimates can be made for these receptors.

Only the hourly summary of concentrations is printed. The meteorological data, used for the computation, the final effective height, and the distance to the final height are printed as part of the summary.

Note that since the terrain option is employed in this run, receptors whose ground-level elevations are lower than the source ground-level elevation are tagged with one asterisk, although computations are made for these receptors. Receptors whose ground-level elevations exceed that of the stack top are tagged with two asterisks, and no computations are attempted for these receptors.

This problem also shows that receptors can be at the same position and stacked in the vertical.

EXAMPLE TWO

The second example, in four parts, is a sensitivity study. For estimating concentrations directly downwind of an atypical source (low stack with high buoyancy), four situations can be described by using different parameters: A) final effective height, B) gradual plume rise, C) buoyancy-induced dispersion with final plume height, and D) buoyancy-induced dispersion with gradual plume rise. This problem shows that with some sources and meteorological conditions, multipeak concentrations with distance can be obtained, when using the options of gradual plume rise and buoyancy-induced dispersion in combination. A number of runs were made using various wind speed and stability class configurations to find this phenomenon. Other combinations of meteorology and source parameters will not exhibit multipeaks in the concentration profiles so vividly.

Concentrations are determined at various distances downwind from the source over a level surface. The receptors are directly east of the source and the wind is specified from the west (270 degrees).

Although two sources are used in this example, they are actually simulating a variation in stack gas temperature at the same source. Therefore the two sources are located at the same position.

In Run A considering only final rise, note that concentrations for both sources for both hours climb rapidly to a peak at a distance in the vicinity of 1.0 to 2.0 km from the source and then decrease slowly with distance.

In Run B, which considers the gradual rise of the plume, concentrations are somewhat higher near the source, but reach the same peak for the first hour since this peak is at a distance beyond the distance of final rise, 1.35 km for source 1, and 1.08 km for source 2. However, for the second hour, higher concentrations (30% higher for source 1) than in Run A are obtained closer to the source than the distance to final rise.

In Run C, which returns to consideration of final rise, but also includes buoyancy-induced dispersion, maximum concentrations (though slightly lower) are virtually unchanged for hour one. For hour two the maximum concentrations occur at the same distances as for Run A, but are about 80% of those for Run A.

In Run D, in which both gradual plume rise and buoyancy-induced dispersion are considered, maximum concentrations for hour one occur nearer the source and of higher magnitude, 26 to 38% higher, than in Run B. Also, source one has a secondary and a tertiary peak about the primary maximum. Source two has a secondary peak beyond the primary maximum. However, for hour two both sources display single maxima of lower magnitude, 84 to 90%, than that given by Run B, and at approximately the same distance from the source.

For these four runs, only the hourly contribution printouts are obtained; they include the meteorological data, plume height, and distance information.

Figure 3 is a log-log plot of concentration as a function of distance for source 2 for hour 1 for the four runs.

EXAMPLE THREE

The third example is a long term run in that calculations are made using hour-by-hour meteorological data for a full year. This is the only example where the high-five table (option 19 is left zero) is given. Also all receptors in this run are generated using option 8. Since the terrain option (option 1) is also employed, elevations on 36 cards of TYPE 11 are read in. All printout, with the exception of the high-five table, is deleted, (i.e., options 9 through 18 are employed resulting in a savings of many pages of output).

Note that asterisks relating to notes about receptor elevations are given on the receptor lists, but not in the high-five table. Asterisks in the high-five table are used to label the receptor with the highest and second-highest concentrations.

EXAMPLE FOUR

The fourth problem is included primarily as an example of all types of printed output except the high-five table. Also, more sources than can be considered as significant occur, and two sources are specified, (8 and 27) to obtain contribution information, even though they are not among the top 10 in ranking of expected impact. This step employs option 7. Meteorological data and plume height data are given on the hourly contribution printout, but not on the hourly summaries.

The runstream and output for the four examples follow:

```
M21ADO*GUIDE(1).EXAMPLE1
     1       MPTER RUN DEPICTING CONCENTRATIONS FOR VARYING TERRAIN HEIGHTS
     2       AND RECEPTORS WITH VARYING HEIGHTS ABOVE GROUND LEVEL.  TSP CONCENTRATIONS.
     3       PROGRAMMER: TOM PIERCE       9 JANUARY 1980
     4       78 1 1 1 1 4 1 0 1. 1. 14400.
     5       1 1 1 0 1 0 0 0 1 1 1 0 0 0 0 0 1 1 1 0 0 0 0 0
     6       10.,.07,.07,.1,.15,.35,.55,1.,1.,1.,1.,0.,0.
     7       SOURCE #1        0.00    0.00            1000.   50.00  415.00    2.00   20.00100.
     8       ENDP
     9        1KM GRD     1.000     0.000      0.       80.0
    10        1   50M     1.000     0.000     50.       80.0
    11        1  100M     1.000     0.000    100.       80.0
    12        1  150M     1.000     0.000    150.       80.0
    13        1  200M     1.000     0.000    200.       80.0
    14        2KM GRD     2.000     0.000      0.      120.
    15        2   50M     2.000     0.000     50.      120.
    16        2  100M     2.000     0.000    100.      120.
    17        2  150M     2.000     0.000    150.      120.
    18        2  200M     2.000     0.000    200.      120.
    19        3KM GRD     3.000     0.000      0.      140.
    20        3KM 50M     3.000     0.000     50.      140.
    21        3  100M     3.000     0.000    100.      140.
    22        3  150M     3.000     0.000    150.      140.
    23        3  200M     3.000     0.000    200.      140.
    24        4KM GRD     4.000     0.000      0.      160.
    25        4KM 50M     4.000     0.000     50.      160.
    26        4  100M     4.000     0.000    100.      160.
    27        4  150M     4.000     0.000    150.      160.
    28        4  200M     4.000     0.000    200.      160.
    29        ENDREC
    30        78,001,01,3,2.,283.,270.,2000.
```

RUNSTREAM, EXAMPLE 1

```
                              MPTER - VERSION 79365
MPTER RUN DEPICTING CONCENTRATIONS FOR VARYING TERRAIN HEIGHTS
AND RECEPTORS WITH VARYING HEIGHTS ABOVE GROUND LEVEL.  TSP CONCENTRATIONS.
PROGRAMMER: TOM PIERCE        9 JANUARY 1980

                         GENERAL INPUT INFORMATION

 THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT PART FOR    1   1-HOUR PERIODS.
 CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-   1, YEAR-197[illegible].
 A FACTOR OF        1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
  1 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
  A HALF-LIFE OF   14400.00 (SECONDS) HAS BEEN ASSUMED BY THE USER.
  A FACTOR OF       1.0000000 HAS BEEN SPECIFIED TO CONVERT USER HEIGHT UNITS TO METERS.

OPTION        OPTION LIST                       OPTION SPECIFICATION : 0= IGNORE OPTION
                                                                       1= USE OPTION
                       TECHNICAL OPTIONS
    1         TERRAIN ADJUSTMENTS                                      1
    2         DO NOT INCLUDE STACK DOWNWASH CALCULATIONS               1
    3         DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS           1
    4         CALCULATE INITIAL PLUME SIZE                             0
                       INPUT OPTIONS
    5         READ MET DATA FROM CARDS                                 1
    6         READ HOURLY EMISSIONS                                    0
    7         SPECIFY SIGNIFICANT SOURCES                              0
    8         READ RADIAL DISTANCES TO GENERATE RECEPTORS              0
                       PRINTED OUTPUT OPTIONS
    9         DELETE EMISSIONS WITH HEIGHT TABLE                       1
   10         DELETE MET DATA SUMMARY FOR AVG PERIOD                   1
   11         DELETE HOURLY CONTRIBUTIONS                              1
   12         DELETE MET DATA ON HOURLY CONTRIBUTIONS                  0
   13         DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS       0
   14         DELETE HOURLY SUMMARY                                    0
   15         DELETE MET DATA ON HRLY SUMMARY                          0
   16         DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY             0
   17         DELETE AVG-PERIOD CONTRIBUTIONS                          1
   18         DELETE AVERAGING PERIOD SUMMARY                          1
   19         DELETE AVG CONCENTRATIONS AND HI-5 TABLES                1
                       OTHER CONTROL AND OUTPUT OPTIONS
   20         RUN IS PART OF A SEGMENTED RUN                           0
   21         WRITE PARTIAL CONC TO DISK OR TAPE                       0
   22         WRITE HOURLY CONC TO DISK OR TAPE                        0
   23         WRITE AVG-PERIOD CONC TO DISK OR TAPE                    0
   24         PUNCH AVG-PERIOD CONC ONTO CARDS                         0

ANEMOMETER HEIGHT IS:      10.00
EXPONENTS FOR POWER- LAW WIND INCREASE WITH HEIGHT ARE: .07, .07, .10, .15, .35, .55
TERRAIN ADJUSTMENTS ARE: 1.000,1.000,1.000,1.000, .000, .000
```

EXAMPLE 1, PAGE 1

```
                                        POINT SOURCE INFORMATION
   SOURCE                   EAST    NORTH    SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK    STACK    POTEN. IMPACT   EFF     GRD-LVL  BUOY FLUX
                            COORD   COORD    EMISSIONS   EMISSIONS    HT(M)  TEMP(K)  DIAM(M) VEL(M/SEC)(MICRO G/M**3)  HT(M)    ELEV        F
                            (USER UNITS)                                                                                        USER HT  M**4/S**3
                                                                                                                                UNITS
  1 SOURCE #1                .00      .00        .00      1000.00      50.0   415.0     2.0     20.0      1500.05       196.96   100.00     57.66
 SIGNIFICANT PART POINT SOURCES

        RANK           CHI-MAX    SOURCE NO.
                   (MICROGRAMS/M**3)

          1            1500.05       1

                        ADDITIONAL INFORMATION ON SOURCES.
   EMISSION INFORMATION FOR     1 (NPT) POINT SOURCES HAS BEEN INPUT
    1 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
  THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
     1

                       RECEPTOR INFORMATION

  RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPTOR HT        RECEPTOR GROUND LEVEL
                              COORD     COORD   ABV LOCAL GRD LVL         ELEVATION
                              (USER UNITS)           (METERS)          (USER HT UNITS)
     1 *         1KM GRD       1.000     .000          .0                  80.0
     2 *         1    50M      1.000     .000        50.0                  80.0
     3 *         1   100M      1.000     .000       100.0                  80.0
     4 *         1   150M      1.000     .000       150.0                  80.0
     5 *         1   200M      1.000     .000       200.0                  80.0
     6           2KM GRD       2.000     .000          .0                  80.0
     7           2    50M      2.000     .000          .0                 120.0
     8           2   100M      2.000     .000        50.0                 120.0
     9           2   150M      2.000     .000       100.0                 120.0
    10           2   200M      2.000     .000       150.0                 120.0
    11           3KM GRD       3.000     .000       200.0                 120.0
    12           3KM 50M       3.000     .000          .0                 140.0
    13           3   100M      3.000     .000        50.0                 140.0
    14           3   150M      3.000     .000       100.0                 140.0
    15           3   200M      3.000     .000       150.0                 140.0
    16**         4KM GRD       4.000     .000       200.0                 140.0
    17**         4KM 50M       4.000     .000          .0                 160.0
    18**         4   100M      4.000     .000        50.0                 160.0
    19**         4   150M      4.000     .000       100.0                 160.0
    20**         4   200M      4.000     .000       150.0                 160.0
                                                    200.0                 160.0
   * ONE ASTERISK INDICATES THAT THE ASSOCIATED RECEPTOR(S) HAVE A GROUND LEVEL ELEVATION LOWER THAN THE LOWEST SOURCE BASE ELEVATION.
  CAUTION SHOULD BE USED IN INTERPRETING CONCENTRATIONS FOR THESE RECEPTORS.
  **  TWO ASTERISKS INDICATE THAT THE ASSOCIATED RECEPTOR(S) HAVE GROUND LEVEL ELEVATIONS ABOVE THE LOWEST STACK TOP.
    CONSEQUENTLY NO CALCULATIONS WILL BE PERFORMED WITH THIS RECEPTOR.A SERIES OF ASTERISKS WILL INSTEAD APPEAR IN THE OUTPUT.
```

```
MPTER RUN DEPICTING CONCENTRATIONS FOR VARYING TERRAIN HEIGHTS
AND RECEPTORS WITH VARYING HEIGHTS ABOVE GROUND LEVEL.  TSP CONCENTRATIONS.
PROGRAMMER: TOM PIERCE        9 JANUARY 1980

                    PART SUMMARY CONCENTRATION TABLE(MICROGRAMS/M**3)      78/   1 * HOUR  1

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)   (K)      CLASS

  1   270.00     2.00  2000.00   283.00       3

                     1         2         3         4         5         6         7         8         9        10
FINAL HT (M)      286.76
DIST FIN HT (KM)      .622

    RECEPTOR           EAST      NORTH    RECEPTOR HT       RECEPTOR        TOTAL FROM     TOTAL FROM   CONCENTRATION
    NO. NAME           COORD     COORD    ABV GRD (M)    GRD-LVL ELEV     SIGNIF POINT    ALL SOURCES       RANK
                                                        (USER HT UNITS)     SOURCES

     1 *   1KM GRD      1.00       .00          .0            80.0          6.1159         6.1159           20
     2 *   1    50M     1.00       .00        50.0            80.0         59.4520        59.4520           19
     3 *   1   100M     1.00       .00       100.0            80.0        590.5824       590.5824           17
     4 *   1   150M     1.00       .00       150.0            80.0       3009.8202      3009.8202            7
     5 *   1   200M     1.00       .00       200.0            80.0       7858.8595      7858.8595            6
     6     2KM GRD      2.00       .00          .0           120.0        589.6718       589.6718           18
     7     2    50M     2.00       .00        50.0           120.0        785.3207       785.3207           16
     8     2   100M     2.00       .00       100.0           120.0       1328.2233      1328.2233           11
     9     2   150M     2.00       .00       150.0           120.0       2058.2210      2058.2210            9
    10     2   200M     2.00       .00       200.0           120.0       2687.7896      2687.7896            8
    11     3KM GRD      3.00       .00          .0           140.0        918.0006       918.0006           15
    12     3KM  50M     3.00       .00        50.0           140.0        965.0574       965.0574           14
    13     3   100M     3.00       .00       100.0           140.0       1087.7530      1087.7530           13
    14     3   150M     3.00       .00       150.0           140.0       1237.3956      1237.3956           12
    15     3   200M     3.00       .00       200.0           140.0       1352.9459      1352.9459           10
    16**   4KM GRD      4.00       .00          .0           160.0           .0000****************           1
    17**   4KM  50M     4.00       .00        50.0           160.0           .0000****************           2
    18**   4   100M     4.00       .00       100.0           160.0           .0000****************           3
    19**   4   150M     4.00       .00       150.0           160.0           .0000****************           4
    20**   4   200M     4.00       .00       200.0           160.0           .0000****************           5

AFIN
```

EXAMPLE 1, PAGE 3

RUNSTREAM, EXAMPLE 2A

```
M21ADO*GUIDE(1).EXAMPLE2A
      1       MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
      2       NO GRADUAL PLUME RISE OR INITIAL DISPERSION CALCULATIONS.
      3       DATA INPUT BY TOM PIERCE    30 OCTOBER 1979
      4       79,299,1,2,1,3,2,0,1.,1.,295200.
      5       0,1,1,0,1,0,0,0,0,1,0,0,0,1,1,1,1,1,1,0,0,0,0,0
      6       10.,.07,.07,.1,.15,.35,.55,.0,.0,.0,.0,.0,.0
      7       SRC 1 3.5                 81.09           12.8    727.6   3.5      23.5
      8       SRC 14 427.6              81.09           12.8    427.6   3.5      23.5
      9       ENDP
     10       1        .1
     11       2        .2
     12       3        .3
     13       4         .4
     14       5        .5
     15       6        .6
     16       7        .7
     17       8        .8
     18       9        .9
     19       10      1.
     20       11      1.2
     21       12      1.5
     22       13      2.
     23       14      3.
     24       15      4.
     25       16      5.
     26       17      6.
     27       18      7.
     28       19      8.
     29       20      9.
     30       21      10.
     31       22      12.
     32       23      15.
     33       24      20.
     34       25      30.
     35       26      40.
     36       27      50.
     37       ENDREC
     38       79,299,1,2,5.,277.6,270.,2000.
     39       79,299,2,1,2.,277.6,270.,2000.
```

```
                                  MPTER - VERSION 79365
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
NO GRADUAL PLUME RISE OR INITIAL DISPERSION CALCULATIONS.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                           GENERAL INPUT INFORMATION

 THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT SO2  FOR   2   1-HOUR PERIODS.
 CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-290, YEAR-1978.
 A FACTOR OF      1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
  2 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
  A HALF-LIFE OF  295200.00 (SECONDS) HAS BEEN ASSUMED BY THE USER.

 OPTION       OPTION LIST                          OPTION SPECIFICATION : 0= IGNORE OPTION
                                                                           1= USE OPTION
                        TECHNICAL OPTIONS
      1       TERRAIN ADJUSTMENTS                                           0
      2       DO NOT INCLUDE STACK DOWNWASH CALCULATIONS                    1
      3       DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS                1
      4       CALCULATE INITIAL PLUME SIZE                                  0
                        INPUT OPTIONS
      5       READ MET DATA FROM CARDS                                      1
      6       READ HOURLY EMISSIONS                                         0
      7       SPECIFY SIGNIFICANT SOURCES                                   0
      8       READ RADIAL DISTANCES TO GENERATE RECEPTORS                   0
                        PRINTED OUTPUT OPTIONS
      9       DELETE EMISSIONS WITH HEIGHT TABLE                            0
     10       DELETE MET DATA SUMMARY FOR AVG PERIOD                        1
     11       DELETE HOURLY CONTRIBUTIONS                                   0
     12       DELETE MET DATA ON HOURLY CONTRIBUTIONS                       0
     13       DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS            0
     14       DELETE HOURLY SUMMARY                                         1
     15       DELETE MET DATA ON HRLY SUMMARY                               1
     16       DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY                  1
     17       DELETE AVG-PERIOD CONTRIBUTIONS                               1
     18       DELETE AVERAGING PERIOD SUMMARY                               1
     19       DELETE AVG CONCENTRATIONS AND HI-5 TABLES                     1
                        OTHER CONTROL AND OUTPUT OPTIONS
     20       RUN IS PART OF A SEGMENTED RUN                                0
     21       WRITE PARTIAL CONC TO DISK OR TAPE                            0
     22       WRITE HOURLY CONC TO DISK OR TAPE                             0
     23       WRITE AVG-PERIOD CONC TO DISK OR TAPE                         0
     24       PUNCH AVG-PERIOD CONC ONTO CARDS                              0

 ANEMOMETER HEIGHT=       10.00
 WIND PROFILE WITH HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS:
      FOR STABILITY A:  .07
          STABILITY B:  .07
          STABILITY C:  .10
          STABILITY D:  .15
          STABILITY E:  .35
          STABILITY F:  .55
```

```
                                 POINT SOURCE INFORMATION

 SOURCE                EAST      NORTH     SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK   STACK     POTEN. IMPACT   EFF     GRD-LVL BUOY FLUX
                       COORD     COORD     EMISSIONS   EMISSIONS    HT(M)  TEMP(K)  DIAM(M) VEL(M/SEC)(MICRO G/M**3) HT(M)    ELEV       F
                      (USER UNITS)                                                                                          USER HT  M**4/S**3
                                                                                                                             UNITS

  1 SRC 1  3.5          .00       .00       81.09         .00      12.8   727.6     3.5     23.5         22.78      497.65      .00    421.54
  2 SRC 14 827.6        .00       .00       81.09         .00      12.8   827.6     3.5     23.5         44.56      342.93      .00    222.15

 SIGNIFICANT SO2  POINT SOURCES

      RANK          CHI-MAX     SOURCE NO.
                (MICROGRAMS/M**3)

        1            44.56         2
        2            22.78         1

    TOTAL SO2  EMISSION AND CUMULATIVE FRACTION ACCORDING TO HEIGH

             TOTAL POINT    CUMULATIVE
 HEIGHT(M) EMISSIONS(G/S)   FRACTION

   0 -   5        .00          .000
   6 -  10        .00          .000
  11 -  15     162.18         1.000
  16 -  20        .00         1.000
  21 -  25        .00         1.000
  26 -  30        .00         1.000
  31 -  35        .00         1.000
  36 -  40        .00         1.000
  41 -  45        .00         1.000
  46 -  50        .00         1.000
  51 -  55        .00         1.000
  56 -  60        .00         1.000
  61 -  65        .00         1.000
  66 -  70        .00         1.000
  71 -  75        .00         1.000
  76 -  80        .00         1.000
  81 -  85        .00         1.000
  86 -  90        .00         1.000
  91 -  95        .00         1.000
  96 - 100        .00         1.000

 TOTAL        162.18

                         ADDITIONAL INFORMATION ON SOURCES.

   EMISSION INFORMATION FOR     2 (NPT) POINT SOURCES HAS BEEN INPUT
   2 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
 THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
     2    1

                        RECEPTOR INFORMATION

 RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPTOR HT       RECEPTOR GROUND LEVEL
                             COORD     COORD  ABV LOCAL GRD LVL          ELEVATION
```

```
                            (USER UNITS)        (METERS)        (USER HT UNITS)
     1        1              .100      .000      .0               .0
     2        2              .200      .000      .0               .0
     3        3              .300      .000      .0               .0
     4        4              .400      .000      .0               .0
     5        5              .500      .000      .0               .0
     6        6              .600      .000      .0               .0
     7        7              .700      .000      .0               .0
     8        8              .800      .000      .0               .0
     9        9              .900      .000      .0               .0
    10       10             1.000      .000      .0               .0
    11       11             1.200      .000      .0               .0
    12       12             1.500      .000      .0               .0
    13       13             2.000      .000      .0               .0
    14       14             3.000      .000      .0               .0
    15       15             4.000      .000      .0               .0
    16       16             5.000      .000      .0               .0
    17       17             6.000      .000      .0               .0
    18       18             7.000      .000      .0               .0
    19       19             8.000      .000      .0               .0
    20       20             9.000      .000      .0               .0
    21       21            10.000      .000      .0               .0
    22       22            12.000      .000      .0               .0
    23       23            15.000      .000      .0               .0
    24       24            20.000      .000      .0               .0
    25       25            30.000      .000      .0               .0
    26       26            40.000      .000      .0               .0
    27       27            50.000      .000      .0               .0
```

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MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
NO GRADUAL PLUME RISE OR INITIAL DISPERSION CALCULATIONS.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                    SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 299 : HOUR  1

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)   (K)      CLASS

  1   270.00     5.00  2000.00   277.60      4

                      1         2         3         4         5         6         7         8         9        10
FINAL HT (M)       304.76    220.56
DIST FIN HT (KM)     1.354     1.070

   RANK      1         2

                                                                                                  TOTAL      TOTAL
SOURCE #     2         1                                                                          SIGNIF     ALL POINT
RECEP #                                                                                           POINT      SOURCES
   1       .000      .000
   2       .000      .000                                                                          .000       .000
   3       .000      .000                                                                          .000       .000
   4       .000      .000                                                                          .000       .000
   5       .108      .000                                                                          .000       .000
   6      1.617      .006                                                                          .108       .108
   7      7.132      .128                                                                         1.622      1.622
   8     16.942      .826                                                                         7.260      7.260
   9     28.549     2.770                                                                        17.768     17.768
  10     39.302     6.172                                                                        31.319     31.319
  11     53.495    15.467                                                                        45.474     45.474
  12     58.210    27.210                                                                        68.963     68.963
  13     48.616    32.441                                                                        85.420     85.420
  14     29.271    23.083                                                                        81.058     81.058
  15     17.823    15.548                                                                        52.214     52.214
  16     11.637    11.023                                                                        33.371     33.371
  17      8.270     7.988                                                                        22.660     22.660
  18      6.179     6.022                                                                        16.262     16.262
  19      4.798     4.705                                                                        12.201     12.201
  20      3.851     3.800                                                                         9.498      9.498
  21      3.202     3.174                                                                         7.651      7.651
  22      2.450     2.421                                                                         6.376      6.376
  23      1.908     1.907                                                                         4.870      4.870
  24      1.477     1.477                                                                         3.815      3.815
  25      1.041     1.041                                                                         2.955      2.955
  26       .813      .813                                                                         2.083      2.083
  27       .671      .671                                                                         1.626      1.626
                                                                                                  1.343      1.343
```

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
NO GRADUAL PLUME RISE OR INITIAL DISPERSION CALCULATIONS.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                              SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES       79/ 299 : HOUR  2

HOUR   THETA    SPEED   MIXING    TEMP   STABILITY
       (DEG)    (M/S) HEIGHT(M)   (K)      CLASS

  2   270.00    2.30  2000.00   277.60       1

                          1          2          3          4          5          6          7          8          9          10
FINAL HT (M)         782.70     532.29
DIST FIN HT (KM)        1.350      1.070

  RANK      1          2                                                                                        TOTAL      TOTAL
                                                                                                                SIGNIF     ALL POINT
SOURCE #    2          1                                                                                        POINT      SOURCES
RECEP #
   1       .000       .000                                                                                        .000       .000
   2       .000       .000                                                                                        .000       .000
   3       .000       .000                                                                                        .000       .000
   4       .000       .000                                                                                        .000       .000
   5       .003       .000                                                                                        .003       .003
   6      1.573       .005                                                                                       1.578      1.578
   7     17.364       .910                                                                                      18.274     18.274
   8     44.581      8.347                                                                                      52.928     52.928
   9     62.685     22.658                                                                                      85.343     85.343
  10     67.256     35.060                                                                                     102.316    102.316
  11     56.349     41.700                                                                                      98.049     98.049
  12     35.273     31.576                                                                                      66.849     66.849
  13     20.906     20.810                                                                                      41.716     41.716
  14     14.498     14.499                                                                                      28.997     28.997
  15     11.282     11.282                                                                                      22.564     22.564
  16      9.292      9.292                                                                                      18.584     18.584
  17      7.932      7.932                                                                                      15.864     15.864
  18      6.940      6.940                                                                                      13.880     13.880
  19      6.183      6.183                                                                                      12.365     12.365
  20      5.584      5.584                                                                                      11.168     11.168
  21      5.098      5.098                                                                                      10.197     10.197
  22      4.356      4.356                                                                                       8.712      8.712
  23      3.594      3.594                                                                                       7.188      7.188
  24      2.805      2.805                                                                                       5.610      5.610
  25      1.978      1.978                                                                                       3.955      3.955
  26      1.542      1.542                                                                                       3.084      3.084
  27      1.270      1.270                                                                                       2.540      2.540
```

RUNSTEAM, EXAMPLE 2B

```
M21ADO*GUIDE(1).EXAMPLE2B
        MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
        GRADUAL PLUME RISE OPTION EMPLOYED.
        DATA INPUT BY TOM PIERCE    30 OCTOBER 1979
        79,299,1,2,1,3,2,0,1.,1.,295200.
        0,1,0,0,1,0,0,0,0,1,0,0,0,1,1,1,1,1,1,0,0,0,0,0
        10.,.07,.07,.1,.15,.35,.55,.0,.0,.0,.0,.0,.0
        SRC 1 3.5                     81.09           12.8    727.6   3.5     23.5
        SRC 14 427.6                  81.09           12.8    427.6   3.5     23.5
        ENDP
        1          .1
        2          .2
        3          .3
        4           .4
        5          .5
        6          .6
        7          .7
        8          .8
        9          .9
        10         1.
        11         1.2
        12         1.5
        13         2.
        14         3.
        15         4.
        16         5.
        17         6.
        18         7.
        19         8.
        20         9.
        21         10.
        22         12.
        23         15.
        24         20.
        25         30.
        26         40.
        27         50.
        ENDREC
        79,299,1,2,5.,277.6,270.,2000.
        79,299,2,1,2.,277.6,270.,2000.
```

```
                                    MPTER - VERSION 79365
     MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
     GRADUAL PLUME RISE OPTION EMPLOYED.
     DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                               GENERAL INPUT INFORMATION

      THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT SO2  FOR    2   1-HOUR PERIODS.
      CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-200, YEAR-1970.
      A FACTOR OF       1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
       2 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
       A HALF-LIFE OF  295200.00 (SECONDS) HAS BEEN ASSUMED BY THE USER.

      OPTION        OPTION LIST                    OPTION SPECIFICATION : 0- IGNORE OPTION
                                                                          1= USE OPTION
                              TECHNICAL OPTIONS
         1          TERRAIN ADJUSTMENTS                                    0
         2          DO NOT INCLUDE STACK DOWNWASH CALCULATIONS             1
         3          DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS         0
         4          CALCULATE INITIAL PLUME SIZE                           0
                              INPUT OPTIONS
         5          READ MET DATA FROM CARDS                               1
         6          READ HOURLY EMISSIONS                                  0
         7          SPECIFY SIGNIFICANT SOURCES                            0
         8          READ RADIAL DISTANCES TO GENERATE RECEPTORS            0
                              PRINTED OUTPUT OPTIONS
         9          DELETE EMISSIONS WITH HEIGHT TABLE                     0
        10          DELETE MET DATA SUMMARY FOR AVG PERIOD                 1
        11          DELETE HOURLY CONTRIBUTIONS                            0
        12          DELETE MET DATA ON HOURLY CONTRIBUTIONS                0
        13          DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS     0
        14          DELETE HOURLY SUMMARY                                  1
        15          DELETE MET DATA ON HRLY SUMMARY                        1
        16          DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY           1
        17          DELETE AVG-PERIOD CONTRIBUTIONS                        1
        18          DELETE AVERAGING PERIOD SUMMARY                        1
        19          DELETE AVG CONCENTRATIONS AND HI-5 TABLES              1
                              OTHER CONTROL AND OUTPUT OPTIONS
        20          RUN IS PART OF A SEGMENTED RUN                         0
        21          WRITE PARTIAL CONC TO DISK OR TAPE                     0
        22          WRITE HOURLY CONC TO DISK OR TAPE                      0
        23          WRITE AVG-PERIOD CONC TO DISK OR TAPE                  0
        24          PUNCH AVG-PERIOD CONC ONTO CARDS                       0

      ANEMOMETER HEIGHT-       10.00
      WIND PROFILE WITH HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS:
          FOR STABILITY A:  .07
              STABILITY B:  .07
              STABILITY C:  .10
              STABILITY D:  .15
              STABILITY E:  .35
              STABILITY F:  .55
```

```
                                       POINT SOURCE INFORMATION

  SOURCE                 EAST      NORTH     SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK   STACK    POTEN. IMPACT  EFF     GRD-LVL  BUOY FLUX
                         COORD     COORD     EMISSIONS   EMISSIONS    HT(M)  TEMP(K)  DIAM(M)VEL(M/SEC)(MICRO G/M**3) HT(M)   ELEV        F
                        (USER UNITS)                                                                                          USER HT  M**4/S**3
                                                                                                                               UNITS

  1 SRC 1 3.5            .00        .00       81.09        .00        12.8   327.4     3.5     23.5          22.78     457.65     .00    421.54
  2 SRC 14 427.6         .00        .00       81.09        .00        12.8   427.6     3.5     23.5          44.56     342.93     .00    222.15
 SIGNIFICANT SO2  POINT SOURCES

      RANK           CHI-MAX     SOURCE NO.
                 (MICROGRAMS/M**3)

        1             44.56         2
        2             22.78         1

     TOTAL SO2  EMISSION AND CUMULATIVE FRACTION ACCORDING TO HEIGHT

             TOTAL POINT    CUMULATIVE
 HEIGHT(M) EMISSIONS(G/S)   FRACTION

   0 -  5        .00          .000
   6 - 10        .00          .000
  11 - 15     162.18         1.000
  16 - 20        .00         1.000
  21 - 25        .00         1.000
  26 - 30        .00         1.000
  31 - 35        .00         1.000
  36 - 40        .00         1.000
  41 - 45        .00         1.000
  46 - 50        .00         1.000
  51 - 55        .00         1.000
  56 - 60        .00         1.000
  61 - 65        .00         1.000
  66 - 70        .00         1.000
  71 - 75        .00         1.000
  76 - 80        .00         1.000
  81 - 85        .00         1.000
  86 - 90        .00         1.000
  91 - 95        .00         1.000
  96 -100        .00         1.000

 TOTAL       162.18

                         ADDITIONAL INFORMATION ON SOURCES.

   EMISSION INFORMATION FOR     2 (NPT) POINT SOURCES HAS BEEN INPUT
   2 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
  THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
       2    1

                        RECEPTOR INFORMATION

  RECEPTOR    IDENTIFICATION  EAST      NORTH     RECEPTOR HT       RECEPTOR GROUND LEVEL
                              COORD     COORD   ABV LOCAL GRD LVL        ELEVATION
```

EXAMPLE 2B, PAGE 3

```
                          (USER UNITS)         (METERS)         (USER HT UNITS)

    1         1              .100      .000        .0                  .0
    2         2              .200      .000        .0                  .0
    3         3              .300      .000        .0                  .0
    4         4              .400      .000        .0                  .0
    5         5              .500      .000        .0                  .0
    6         6              .600      .000        .0                  .0
    7         7              .700      .000        .0                  .0
    8         8              .800      .000        .0                  .0
    9         9              .900      .000        .0                  .0
   10        10             1.000      .000        .0                  .0
   11        11             1.200      .000        .0                  .0
   12        12             1.500      .000        .0                  .0
   13        13             2.000      .000        .0                  .0
   14        14             3.000      .000        .0                  .0
   15        15             4.000      .000        .0                  .0
   16        16             5.000      .000        .0                  .0
   17        17             6.000      .000        .0                  .0
   18        18             7.000      .000        .0                  .0
   19        19             8.000      .000        .0                  .0
   20        20             9.000      .000        .0                  .0
   21        21            10.000      .000        .0                  .0
   22        22            12.000      .000        .0                  .0
   23        23            15.000      .000        .0                  .0
   24        24            20.000      .000        .0                  .0
   25        25            30.000      .000        .0                  .0
   26        26            40.000      .000        .0                  .0
   27        27            50.000      .000        .0                  .0
```

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
GRADUAL PLUME RISE OPTION EMPLOYED.
DATA INPUT BY TOM PIERCE      30 OCTOBER 1979

                          SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 299 : HOUR  1

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)    (K)     CLASS

  1    270.00     5.10  2000.00   277.60       2

                          1          2         3          4          5          6          7          8          9          10
FINAL HT (M)          304.76     229.56
DIST FIN HT (KM)          1.358      1.079

    RANK       1          2
                                                                                                                TOTAL        TOTAL
                                                                                                                SIGNIF       ALL POINT
SOURCE #       2          1                                                                                     POINT        SOURCES
RECEP #
   1          .030       .000                                                                                      .030         .030
   2         2.613       .130                                                                                     2.743        2.743
   3        11.376      1.212                                                                                    12.588       12.588
   4        20.788      3.338                                                                                    24.126       24.126
   5        32.587      7.353                                                                                    39.940       39.940
   6        40.819     11.576                                                                                    52.396       52.396
   7        45.576     15.242                                                                                    60.818       60.818
   8        47.713     18.075                                                                                    65.788       65.788
   9        48.073     20.083                                                                                    68.156       68.156
  10        47.301     21.383                                                                                    68.683       68.683
  11        53.096     22.821                                                                                    75.917       75.917
  12        58.210     27.210                                                                                    85.420       85.420
  13        48.616     32.441                                                                                    81.058       81.058
  14        28.271     23.943                                                                                    52.214       52.214
  15        17.423     15.949                                                                                    33.371       33.371
  16        11.637     11.023                                                                                    22.660       22.660
  17         8.279      7.983                                                                                    16.262       16.262
  18         6.179      6.022                                                                                    12.201       12.201
  19         4.703      4.705                                                                                     9.408        9.408
  20         3.851      3.800                                                                                     7.651        7.651
  21         3.202      3.174                                                                                     6.376        6.376
  22         2.439      2.431                                                                                     4.870        4.870
  23         1.908      1.907                                                                                     3.815        3.815
  24         1.477      1.477                                                                                     2.955        2.955
  25         1.041      1.041                                                                                     2.083        2.083
  26          .813       .813                                                                                     1.626        1.626
  27          .671       .671                                                                                     1.343        1.343
```

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
GRADUAL PLUME RISE OPTION EMPLOYED.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                          SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES       79/ 299 : HOUR  2

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)    (K)     CLASS

  2   270.00      2.10  2000.00   277.60      1

                         1          2          3          4          5          6          7          8          9         10
FINAL HT (M)       782.70     532.20
DIST FIN HT (KM)       1.354      1.079

   RANK      1          2                                                                                  TOTAL       TOTAL
                                                                                                           SIGNIF      ALL POINT
                                                                                                           POINT       SOURCES
SOURCE #     2          1
RECEP #
    1        .000       .000                                                                                .000        .000
    2        .000       .000                                                                                .000        .000
    3        .019       .000                                                                                .019        .019
    4        .798       .027                                                                                .825        .825
    5       8.932      1.089                                                                              10.021      10.021
    6      37.836     11.002                                                                              48.838      48.838
    7      66.056     30.054                                                                              96.110      96.110
    8      78.757     46.202                                                                             124.959     124.959
    9      78.544     53.806                                                                             132.350     132.350
   10      71.755     54.328                                                                             126.083     126.083
   11      56.309     45.684                                                                             101.993     101.993
   12      35.273     31.576                                                                              66.849      66.849
   13      20.906     20.810                                                                              41.716      41.716
   14      14.499     14.499                                                                              28.997      28.997
   15      11.282     11.282                                                                              22.564      22.564
   16       9.292      9.292                                                                              18.584      18.584
   17       7.932      7.932                                                                              15.864      15.864
   18       6.940      6.940                                                                              13.880      13.880
   19       6.183      6.183                                                                              12.365      12.365
   20       5.584      5.584                                                                              11.168      11.168
   21       5.099      5.099                                                                              10.197      10.197
   22       4.356      4.356                                                                               8.712       8.712
   23       3.594      3.594                                                                               7.188       7.188
   24       2.805      2.805                                                                               5.610       5.610
   25       1.978      1.978                                                                               3.955       3.955
   26       1.542      1.542                                                                               3.084       3.084
   27       1.270      1.270                                                                               2.540       2.540
```

RUNSTREAM, EXAMPLE 2C

```
M21ADO*GUIDE(1).EXAMPLE2C
        MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
        OPTION FOR CALCUALTION OF INITIAL DISPERSION EMPLOYED.
        DATA INPUT BY TOM PIERCE    30 OCTOBER 1979
        79,299,1,2,1,3,2,0,1.,1.,295200.
        0,1,1,1,1,0,0,0,0,1,0,0,0,1,1,1,1,1,1,0,0,0,0,0
        10.,.07,.07,.1,.15,.35,.55,.0,.0,.0,.0,.0,.0
        SRC 1 3.5                81.09           12.8    727.6   3.5     23.5
        SRC 14 427.6             81.09           12.8    427.6   3.5     23.5
        ENDP
        1        .1
        2        .2
        3        .3
        4         .4
        5        .5
        6        .6
        7        .7
        8        .8
        9        .9
        10       1.
        11       1.2
        12       1.5
        13       2.
        14       3.
        15       4.
        16       5.
        17       6.
        18       7.
        19       8.
        20       9.
        21       10.
        22       12.
        23       15.
        24       20.
        25       30.
        26       40.
        27       50.
        ENDREC
        79,299,1,2,5.,277.6,270.,2000.
        79,299,2,1,2.,277.6,270.,2000.
```

```
                              MPTER - VERSION 79365
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
OPTION FOR CALCULATION OF INITIAL DISPERSION EMPLOYED.
DATA INPUT BY TOM PIERCE    30 OCTOBER 1979

                    GENERAL INPUT INFORMATION

 THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT SO2 FOR   2   1-HOUR PERIODS.
 CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-299, YEAR-1979.
 A FACTOR OF       1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
  2 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
  A HALF-LIFE OF  295200.00 (SECONDS) HAS BEEN ASSUMED BY THE USER.

 OPTION       OPTION LIST                      OPTION SPECIFICATION : 0- IGNORE OPTION
                                                                      1- USE OPTION
                          TECHNICAL OPTIONS
    1         TERRAIN ADJUSTMENTS                                      0
    2         DO NOT INCLUDE STACK DOWNWASH CALCULATIONS               1
    3         DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS           1
    4         CALCULATE INITIAL PLUME SIZE                             1
                          INPUT OPTIONS
    5         READ MET DATA FROM CARDS                                 1
    6         READ HOURLY EMISSIONS                                    0
    7         SPECIFY SIGNIFICANT SOURCES                              0
    8         READ RADIAL DISTANCES TO GENERATE RECEPTORS              0
                          PRINTED OUTPUT OPTIONS
    9         DELETE EMISSIONS WITH HEIGHT TABLE                       0
   10         DELETE MET DATA SUMMARY FOR AVG PERIOD                   1
   11         DELETE HOURLY CONTRIBUTIONS                              0
   12         DELETE MET DATA ON HOURLY CONTRIBUTIONS                  0
   13         DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS       0
   14         DELETE HOURLY SUMMARY                                    1
   15         DELETE MET DATA ON HRLY SUMMARY                          1
   16         DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY             1
   17         DELETE AVG-PERIOD CONTRIBUTIONS                          1
   18         DELETE AVERAGING PERIOD SUMMARY                          1
   19         DELETE AVG CONCENTRATIONS AND HI-5 TABLES                1
                          OTHER CONTROL AND OUTPUT OPTIONS
   20         RUN IS PART OF A SEGMENTED RUN                           0
   21         WRITE PARTIAL CONC TO DISK OR TAPE                       0
   22         WRITE HOURLY CONC TO DISK OR TAPE                        0
   23         WRITE AVG-PERIOD CONC TO DISK OR TAPE                    0
   24         PUNCH AVG-PERIOD CONC ONTO CARDS                         0

  ANEMOMETER HEIGHT=       10.00
  WIND PROFILE WITH HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS:
       FOR STABILITY A:  .07
           STABILITY B:  .07
           STABILITY C:  .10
           STABILITY D:  .15
           STABILITY E:  .35
           STABILITY F:  .55
```

```
                                             POINT SOURCE INFORMATION

  SOURCE                  EAST     NORTH    SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK   STACK     POTEN. IMPACT  EFF     GRD-LVL BUOY FLUX
                          COORD    COORD    EMISSIONS   EMISSIONS    HT(M) TEMP(K) DIAM(M)VEL(M/SEC)(MICRO G/M**3)  HT(M)    ELEV        F
                          (USER UNITS)                                                                                      USER HT  M**4/S**3
                                                                                                                             UNITS

  1 SRC 1 3.5               .00      .00       81.09          .00    12.8   727.6     3.5    23.5          22.74    497.65      .00   421.54
  2 SRC 1A 827.6            .00      .00       81.09          .00    12.8   827.6     3.5    23.5          44.56    382.93      .00   222.15
 SIGNIFICANT SO2  POINT SOURCES

      RANK            CHI-MAX    SOURCE NO.
                (MICROGRAMS/M**3)

        1              44.56       2
        2              22.74       1

    TOTAL SO2  EMISSION AND CUMULATIVE FRACTION ACCORDING TO HEIGHT

           TOTAL POINT   CUMULATIVE
 HEIGHT(M) EMISSIONS(G/S)  FRACTION

   0 -  5       .00        .000
   6 - 10       .00        .000
  11 - 15    162.18       1.000
  16 - 20       .00       1.000
  21 - 25       .00       1.000
  26 - 30       .00       1.000
  31 - 35       .00       1.000
  36 - 40       .00       1.000
  41 - 45       .00       1.000
  46 - 50       .00       1.000
  51 - 55       .00       1.000
  56 - 60       .00       1.000
  61 - 65       .00       1.000
  66 - 70       .00       1.000
  71 - 75       .00       1.000
  76 - 80       .00       1.000
  81 - 85       .00       1.000
  86 - 90       .00       1.000
  91 - 95       .00       1.000
  96 -100       .00       1.000

 TOTAL      162.18

                    ADDITIONAL INFORMATION ON SOURCES.

  EMISSION INFORMATION FOR    2 (NPT) POINT SOURCES HAS BEEN INPUT
   2 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
 THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
     2    1

                    RECEPTOR INFORMATION

 RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPTOR HT        RECEPTOR GROUND LEVEL
                             COORD     COORD   ABV LOCAL GRD LVL          ELEVATION
```

EXAMPLE 2C, PAGE 2

```
                     (USER UNITS)        (METERS)       (USER HT UNITS)
  1       1              .100      .000        .0              .0
  2       2              .200      .000        .0              .0
  3       3              .300      .000        .0              .0
  4       4              .400      .000        .0              .0
  5       5              .500      .000        .0              .0
  6       6              .600      .000        .0              .0
  7       7              .700      .000        .0              .0
  8       8              .800      .000        .0              .0
  9       9              .900      .000        .0              .0
 10      10             1.000      .000        .0              .0
 11      11             1.200      .000        .0              .0
 12      12             1.500      .000        .0              .0
 13      13             2.000      .000        .0              .0
 14      14             3.000      .000        .0              .0
 15      15             4.000      .000        .0              .0
 16      16             5.000      .000        .0              .0
 17      17             6.000      .000        .0              .0
 18      18             7.000      .000        .0              .0
 19      19             8.000      .000        .0              .0
 20      20             9.000      .000        .0              .0
 21      21            10.000      .000        .0              .0
 22      22            12.000      .000        .0              .0
 23      23            15.000      .000        .0              .0
 24      24            20.000      .000        .0              .0
 25      25            30.000      .000        .0              .0
 26      26            40.000      .000        .0              .0
 27      27            50.000      .000        .0              .0
```

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```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
OPTION FOR CALCULATION OF INITIAL DISPERSION EMPLOYED.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                    SO2  CONTRIBUTIONS(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES     79/ 289 : HOUR  1

HOUR   THETA     SPEED   MIXING      TEMP    STABILITY
       (DEG)     (M/S)  HEIGHT(M)    (K)       CLASS

  1   270.00      5.10   2010.30    277.60       4


                          1          2         3         4         5         6         7         8         9        10
FINAL HT (M)          394.76     220.56
DIST FIN HT (KM)       1.358      1.070

   RANK             1          2

                                                                                                  TOTAL      TOTAL
SOURCE #            2          1                                                                  SIGNIF     ALL POINT
RECEP #                                                                                           POINT      SOURCES
  1               .000       .000                                                                  .000       .000
  2               .000       .000                                                                  .000       .000
  3               .000       .000                                                                  .000       .000
  4               .094       .000                                                                  .094       .094
  5              1.694       .028                                                                 1.722      1.722
  6              7.819       .348                                                                 8.167      8.167
  7             18.569      1.717                                                                20.286     20.286
  8             30.927      4.711                                                                35.638     35.638
  9             41.987      9.126                                                                51.114     51.114
 10             50.335     18.225                                                                68.560     68.560
 11             58.195     23.630                                                                81.825     81.825
 12             58.121     31.131                                                                89.252     89.252
 13             47.392     32.288                                                                79.680     79.680
 14             27.746     23.270                                                                51.016     51.016
 15             17.216     15.616                                                                32.832     32.832
 16             11.543     10.860                                                                22.403     22.403
 17              8.231      7.897                                                                16.128     16.128
 18              6.153      5.973                                                                12.125     12.125
 19              4.778      4.675                                                                 9.453      9.453
 20              3.841      3.781                                                                 7.622      7.622
 21              3.196      3.162                                                                 6.358      6.358
 22              2.436      2.426                                                                 4.862      4.862
 23              1.907      1.905                                                                 3.812      3.812
 24              1.477      1.476                                                                 2.953      2.953
 25              1.041      1.041                                                                 2.082      2.082
 26               .813       .813                                                                 1.626      1.626
 27               .671       .671                                                                 1.343      1.343
```

EXAMPLE 2C, PAGE 4

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS.
OPTION FOR CALCULATION OF INITIAL DISPERSION EMPLOYED.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                        SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 299 : HOUR  2

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)    (K)     CLASS

  2   270.00      2.00  2000.00   277.60      4

                         1          2         3         4         5         6         7         8         9        10
FINAL HT (M)        742.70     532.20
DIST FIN HT (KM)        1.358      1.079

   RANK      1         2                                                                                       TOTAL       TOTAL
                                                                                                               SIGNIF      ALL POINT
                                                                                                               POINT       SOURCES
SOURCE #     2         1
RECEP #
  1        .000      .000                                                                                        .000        .000
  2        .000      .000                                                                                        .000        .000
  3        .000      .000                                                                                        .000        .000
  4        .002      .000                                                                                        .002        .002
  5        .350      .003                                                                                        .353        .353
  6       6.249      .273                                                                                       6.522       6.522
  7      24.181     3.229                                                                                      27.410      27.410
  8      44.006    11.682                                                                                      55.688      55.688
  9      54.908    22.294                                                                                      77.202      77.202
 10      56.533    29.999                                                                                      86.532      86.532
 11      47.761    33.046                                                                                      80.808      80.808
 12      31.371    25.677                                                                                      57.048      57.048
 13      19.492    18.277                                                                                      37.769      37.769
 14      13.992    13.545                                                                                      27.537      27.537
 15      11.036    10.816                                                                                      21.852      21.852
 16       9.153     9.025                                                                                      18.178      18.178
 17       7.845     7.763                                                                                      15.609      15.609
 18       6.882     6.826                                                                                      13.708      13.708
 19       6.141     6.102                                                                                      12.243      12.243
 20       5.553     5.524                                                                                      11.077      11.077
 21       5.075     5.052                                                                                      10.127      10.127
 22       4.333     4.327                                                                                       8.660       8.660
 23       3.586     3.577                                                                                       7.163       7.163
 24       2.801     2.797                                                                                       5.598        .598
 25       1.976     1.975                                                                                       3.951       3.951
 26       1.541     1.540                                                                                       3.082       3.082
 27       1.269     1.269                                                                                       2.539       2.539
```

RUNSTREAM, EXAMPLE 2D

```
M21ADO•GUIDE(1).EXAMPLE2D
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS OF MET DATA.
CALCULATIONS FOR INITIAL DISPERSION AND GRADUAL PLUME RISE.
DATA INPUT BY TOM PIERCE    30 OCTOBER 1979
79,299,1,2,1,3,2,0,1.,1.,295200.
0,1,0,0,1,0,0,0,0,1,0,0,0,1,1,1,1,1,1,0,0,0,0,0
10.,.07,.07,.1,.15,.35,.55,.0,.0,.0,.0,.0,.0
SRC 1 3.5                    81.09          12.8    727.6  3.5     23.5
SRC 14 427.6                 81.09          12.8    427.6  3.5     23.5
ENDP
1        .1
2        .2
3        .3
4         .4
5        .5
6        .6
7        .7
8        .8
9        .9
10      1.
11      1.2
12      1.5
13      2.
14      3.
15      4.
16      5.
17      6.
18      7.
19      8.
20      9.
21      10.
22      12.
23      15.
24      20.
25      30.
26      40.
27      50.
ENDREC
79,299,1,2,5.,277.6,270.,2000.
79,299,2,1,2.,277.6,270.,2000.
```

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```
                                   MPTER - VERSION 79365
 MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS OF MET DATA.
 CALCULATIONS FOR INITIAL DISPERSION AND GRADUAL PLUME RISE.
 DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                               GENERAL INPUT INFORMATION

  THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT SO2  FOR    2   1-HOUR PERIODS.
  CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-299, YEAR-1979.
  A FACTOR OF        1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
   2 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
   A HALF-LIFE OF   29520.00 (SECONDS) HAS BEEN ASSUMED BY THE USER.

 OPTION        OPTION LIST                          OPTION SPECIFICATION : 0= IGNORE OPTION
                                                                           1= USE OPTION
                         TECHNICAL OPTIONS
     1          TERRAIN ADJUSTMENTS                                        0
     2          DO NOT INCLUDE STACK DOWNWASH CALCULATIONS                 1
     3          DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS             0
     4          CALCULATE INITIAL PLUME SIZE                               0
                         INPUT OPTIONS
     5          READ MET DATA FROM CARDS                                   1
     6          READ HOURLY EMISSIONS                                      0
     7          SPECIFY SIGNIFICANT SOURCES                                0
     8          READ RADIAL DISTANCES TO GENERATE RECEPTORS                0
                         PRINTED OUTPUT OPTIONS
     9          DELETE EMISSIONS WITH HEIGHT TABLE                         0
    10          DELETE MET DATA SUMMARY FOR AVG PERIOD                     1
    11          DELETE HOURLY CONTRIBUTIONS                                0
    12          DELETE MET DATA ON HOURLY CONTRIBUTIONS                    0
    13          DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS         0
    14          DELETE HOURLY SUMMARY                                      1
    15          DELETE MET DATA ON HRLY SUMMARY                            1
    16          DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY               1
    17          DELETE AVG-PERIOD CONTRIBUTIONS                            1
    18          DELETE AVERAGING PERIOD SUMMARY                            1
    19          DELETE AVG CONCENTRATIONS AND HI-5 TABLES                  1
                         OTHER CONTROL AND OUTPUT OPTIONS
    20          RUN IS PART OF A SEGMENTED RUN                             0
    21          WRITE PARTIAL CONC TO DISK OR TAPE                         0
    22          WRITE HOURLY CONC TO DISK OR TAPE                          0
    23          WRITE AVG-PERIOD CONC TO DISK OR TAPE                      0
    24          PUNCH AVG-PERIOD CONC ONTO CARDS                           0

  ANEMOMETER HEIGHT-        10.00
  WIND PROFILE WITH HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS:
       FOR STABILITY A:  .07
           STABILITY B:  .07
           STABILITY C:  .10
           STABILITY D:  .15
           STABILITY E:  .35
           STABILITY F:  .55
```

EXAMPLE 2D, PAGE 2

```
                                        POINT SOURCE INFORMATION
  SOURCE                    EAST     NORTH     SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK    STACK     POTEN. IMPACT   EFF      GRD-LVL  BUOY FLUX
                            COORD    COORD     EMISSIONS   EMISSIONS    HT(M)  TEMP(K)  DIAM(M)  VEL(M/SEC)(MICRO G/M**3)  HT(M)     ELEV        F
                            (USER UNITS)                                                                                            USER HT  M**4/S**3
                                                                                                                                    UNITS
   1 SRC 1 3.5               .00      .00        81.10         .00      12.8   727.6     3.5      23.5         22.78        497.65     .00     421.58
   2 SRC 14 427.6            .00      .00        81.10         .00      12.8   427.6     3.5      23.5         44.56        382.93     .00     222.15
  SIGNIFICANT SO2  POINT SOURCES

       RANK              CHI-MAX    SOURCE NO.
                   (MICROGRAMS/M**3)

         1                44.56        2
         2                22.78        1

     TOTAL SO2  EMISSION AND CUMULATIVE FRACTION ACCORDING TO HEIGHT

             TOTAL POINT   CUMULATIVE
  HEIGHT(M) EMISSIONS(G/S)  FRACTION

   0 -  5        .00          .000
   6 - 10        .00          .000
  11 - 15     162.18         1.000
  16 - 20        .00         1.000
  21 - 25        .00         1.000
  26 - 30        .00         1.000
  31 - 35        .00         1.000
  36 - 40        .00         1.000
  41 - 45        .00         1.000
  46 - 50        .00         1.000
  51 - 55        .00         1.000
  56 - 60        .00         1.000
  61 - 65        .00         1.000
  66 - 70        .00         1.000
  71 - 75        .00         1.000
  76 - 80        .00         1.000
  81 - 85        .00         1.000
  86 - 90        .00         1.000
  91 - 95        .00         1.000
  96 -100        .00         1.000

  TOTAL       162.18

                      ADDITIONAL INFORMATION ON SOURCES.

    EMISSION INFORMATION FOR    2 (NPT) POINT SOURCES HAS BEEN INPUT
    2 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
  THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
       2    1

                    RECEPTOR INFORMATION

 RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPTOR HT       RECEPTOR GROUND LEVEL
                             COORD     COORD   ABV LOCAL GRD LVL         ELEVATION
```

```
                              (USER UNITS)           (METERS)          (USER HT UNITS)

    1          1               .100       .000          .0                 .0
    2          2               .200       .000          .0                 .0
    3          3               .300       .000          .0                 .0
    4          4               .400       .000          .0                 .0
    5          5               .500       .000          .0                 .0
    6          6               .600       .000          .0                 .0
    7          7               .700       .000          .0                 .0
    8          8               .800       .000          .0                 .0
    9          9               .900       .000          .0                 .0
   10         10              1.000       .000          .0                 .0
   11         11              1.200       .000          .0                 .0
   12         12              1.500       .000          .0                 .0
   13         13              2.000       .000          .0                 .0
   14         14              3.000       .000          .0                 .0
   15         15              4.000       .000          .0                 .0
   16         16              5.000       .000          .0                 .0
   17         17              6.000       .000          .0                 .0
   18         18              7.000       .000          .0                 .0
   19         19              8.000       .000          .0                 .0
   20         20              9.000       .000          .0                 .0
   21         21             10.000       .000          .0                 .0
   22         22             12.000       .000          .0                 .0
   23         23             15.000       .000          .0                 .0
   24         24             20.000       .000          .0                 .0
   25         25             30.000       .000          .0                 .0
   26         26             40.000       .000          .0                 .0
   27         27             50.000       .000          .0                 .0
```

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS OF MET DATA.
CALCULATIONS FOR INITIAL DISPERSION AND GRADUAL PLUME RISE.
DATA INPUT BY TOM PIERCE     30 OCTOBER 1979

                              SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 299 : HOUR  1

HOUR   THETA     SPEED   MIXING     TEMP    STABILITY
       (DEG)     (M/S)  HEIGHT(M)   (K)       CLASS

  1   270.00     5.00   2000.00    277.60       2

                           1          2          3          4          5          6          7          8          9         10
FINAL HT (M)          304.76     220.56
DIST FIN HT (KM)        1.350      1.079

   RANK        1          2
                                                                                                            TOTAL       TOTAL
                                                                                                            SIGNIF      ALL POINT
SOURCE #       2          1                                                                                 POINT       SOURCES
RECEP #
   1         .030       .000
   2        2.613       .130                                                                                 .030        .030
   3       11.376      1.212                                                                                2.743       2.743
   4       20.788      3.338                                                                               12.588      12.588
   5       32.587      7.353                                                                               24.126      24.126
   6       40.819     11.576                                                                               39.940      39.940
   7       45.576     15.242                                                                               52.396      52.396
   8       47.713     18.075                                                                               60.818      60.818
   9       48.073     20.083                                                                               65.788      65.788
  10       47.301     21.383                                                                               68.156      68.156
  11       53.095     22.821                                                                               68.683      68.683
  12       58.210     27.210                                                                               75.917      75.917
  13       48.616     32.441                                                                               85.420      85.420
  14       28.271     23.943                                                                               81.058      81.059
  15       17.423     15.948                                                                               52.214      52.214
  16       11.637     11.023                                                                               33.371      33.371
  17        8.279      7.984                                                                               22.660      22.660
  18        6.179      6.022                                                                               16.262      16.262
  19        4.794      4.705                                                                               12.201      12.201
  20        3.851      3.800                                                                                9.498       9.499
  21        3.202      3.174                                                                                7.651       7.651
  22        2.439      2.431                                                                                6.376       6.376
  23        1.908      1.907                                                                                4.870       4.870
  24        1.477      1.477                                                                                3.815       3.815
  25        1.041      1.041                                                                                2.955       2.955
  26         .813       .813                                                                                2.083       2.083
  27         .671       .671                                                                                1.626       1.626
                                                                                                            1.343       1.343
```

```
MPTER RUN FOR SENSITIVITY TEST INVOLVING 2 SOURCES AND 2 HOURS OF MET DATA.
CALCULATIONS FOR INITIAL DISPERSION AND GRADUAL PLUME RISE.
DATA INPUT BY TOM PIERCE      30 OCTOBER 1979

                        SO2  CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 299 : HOUR  2

HOUR   THETA     SPEED   MIXING    TEMP   STABILITY
       (DEG)     (M/S) HEIGHT(M)   (K)      CLASS

  2   270.00      2.00  2000.00   277.60      1

                         1          2          3          4          5          6          7          8          9         10
FINAL HT (M)         782.70     532.20
DIST FIN HT (KM)       1.358      1.279

   RANK       1          2                                                                       TOTAL      TOTAL
                                                                                                  SIGNIF     ALL POINT
                                                                                                  POINT      SOURCES

SOURCE #      2          1
RECEP #
   1        .000       .000                                                                      .000       .000
   2        .000       .000                                                                      .000       .000
   3        .019       .000                                                                      .019       .019
   4        .798       .027                                                                      .825       .825
   5       8.932      1.089                                                                    10.021     10.021
   6      37.836     11.002                                                                    48.838     48.838
   7      66.056     30.054                                                                    96.110     96.110
   8      78.757     46.202                                                                   124.959    124.959
   9      78.544     53.806                                                                   132.350    132.350
  10      71.755     54.328                                                                   126.083    126.083
  11      56.309     45.684                                                                   101.993    101.993
  12      35.273     31.576                                                                    66.849     66.849
  13      20.906     20.810                                                                    41.716     41.716
  14      14.498     14.499                                                                    28.997     28.997
  15      11.282     11.282                                                                    22.564     22.564
  16       9.292      9.292                                                                    18.584     18.584
  17       7.932      7.932                                                                    15.864     15.864
  18       6.940      6.940                                                                    13.880     13.880
  19       6.183      6.183                                                                    12.365     12.365
  20       5.584      5.584                                                                    11.168     11.168
  21       5.098      5.098                                                                    10.197     10.197
  22       4.356      4.356                                                                     8.712      8.712
  23       3.594      3.594                                                                     7.188      7.188
  24       2.805      2.805                                                                     5.610      5.610
  25       1.978      1.978                                                                     3.955      3.955
  26       1.542      1.542                                                                     3.084      3.084
  27       1.270      1.270                                                                     2.540      2.540
```

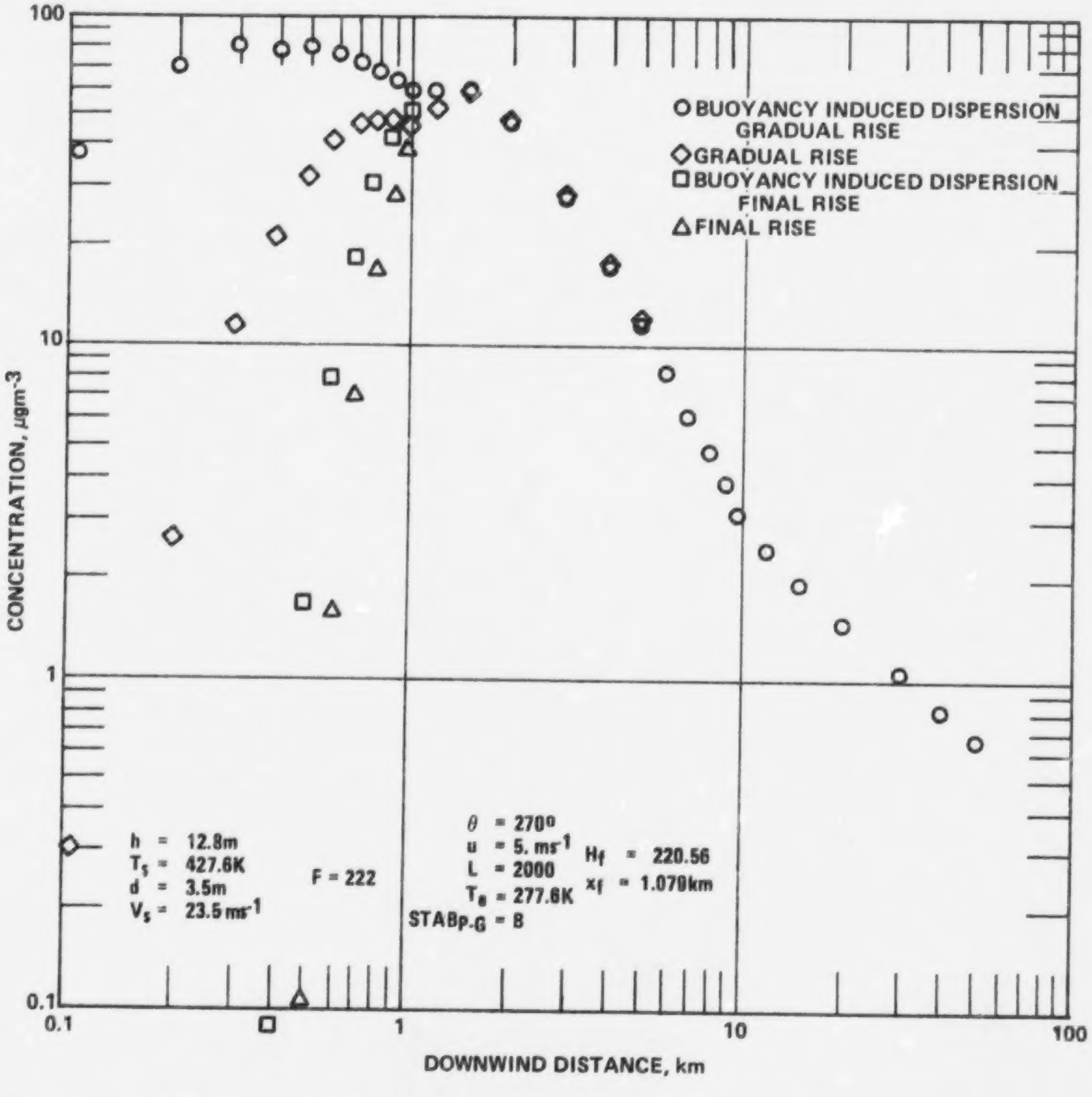

Figure 5. Concentration as function of distance for source 2, hour 1 for four runs of example 2.

RUNSTREAM, EXAMPLE 3

```
M21ADO*GUIDE(1).EXAMPLE3
            MPTER RUN FOR 366 DAYS OF DATA
            MET DATA READ OFF PREPROCESSED MET DATA FILE.
            DATA INPUT BY TOM PIERCE      13 APRIL 1980
            64,123,1,122,24,3,4,0,1.,1.,0.
            1,1,1,0,0,0,0,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,0,0
            7.,.1,.15,.2,.25,.3,.3,0.,0.,0.,0.,0.,0.
            STACK #1    .0              36.22             83.2  428.      3.05    19.42   150.
            STACK #2                    1395.2            70.7  462.      3.96    28.19   150.
            STACK #3                    1086.1           114.3  415.      3.35    28.77   150.
            STACK #4                    3434.8           243.8  405.      5.91    33.83   150.
            ENDP
            93814 64 93815 64
            0.9,1.5,2.,3.8,6.2
            01        164.6     152.4     143.3     155.4      140.2
             2        167.6     167.6     175.3     201.2      140.2
             3        160.0     187.5     190.5     216.4      140.2
             4        149.4     219.5     195.1     219.5      164.6
             5        149.4     207.3     198.1     138.7      152.4
             6        146.3     167.6     176.8     149.4      146.3
             7        143.3     146.3     138.7     143.3      219.5
             8        143.3     138.7     138.7     219.5      219.5
             9        138.7     138.7     146.3     219.5      219.5
            10        138.7     138.7     185.9     219.5      219.5
            11        138.7     185.9     219.5     219.5      219.5
            12        138.7     201.2     201.2     219.5      219.5
            13        158.5      179.8     179.8     219.5     219.5
            14        185.9      219.5     219.5     219.5     219.5
            15        213.4      170.7     170.7     219.5     219.5
            16        213.4      161.5     164.6     219.5     219.5
            17        182.9      219.5     167.6     219.5     219.5
            18        155.4      198.1     176.8     219.5     219.5
            19        143.3      143.3     198.1     219.5     213.4
            20        138.7      182.9     204.2     185.9     219.5
            21        138.7      219.5     219.5     179.8     219.5
            22        138.7      213.4     219.5     185.9     158.5
            23        138.7      138.7     150.9     140.2     138.7
            24        140.2      138.7     138.7     140.2     140.2
            25        140.2      140.2     143.3     146.3     170.7
            26        143.3      140.2     140.2     140.2     219.5
            27        146.3      140.2     138.7     140.2     155.4
            28        152.4      141.7     138.7     143.3     138.7
            29        161.5      144.8     140.2     146.3     143.3
            30        185.9      140.2     140.2     149.4     158.5
            31        219.5      140.2     143.3     149.4     167.6
            32        205.7      140.2     143.3     146.3     219.5
            33        192.0      143.3     143.3     143.3     198.1
            34        179.8      140.2     143.3     143.3     189.0
            35        170.7      140.2     143.3     146.3     182.9
            36        164.6      140.2     143.3     146.3     146.3
            ENDREC
```

```
                                           MPTER - VERSION 79365
MPTER RUN FOR 366 DAYS OF DATA
MET DATA READ OF UNIT 11, HRLY CONCS WRITTEN TO UNIT 12
DATA INPUT BY TOM PIERCE      10 FEBRUARY 1980

                              GENERAL INPUT INFORMATION

 THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT SO2  FOR 366  24-HOUR PERIODS.
 CONCENTRATION ESTIMATES BEGIN ON HOUR- 1, JULIAN DAY-  1, YEAR-1964.
 A FACTOR OF       1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
  4 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
THIS RUN WILL NOT CONSIDER ANY POLLUTANT LOSS.
 HIGH-FIVE SUMMARY CONCENTRATION TABLES WILL BE OUTPUT FOR   4 AVERAGING PERIODS.
 AVG TIMES OF 1,3,8, AND 24 HOURS ARE AUTOMATICALLY DISPLAYED.
  A FACTOR OF      1.0000000 HAS BEEN SPECIFIED TO CONVERT USER HEIGHT UNITS TO METERS.
 OPTION        OPTION LIST                       OPTION SPECIFICATION : 0= IGNORE OPTION
                                                                        1= USE OPTION
                         TECHNICAL OPTIONS
    1         TERRAIN ADJUSTMENTS                                         1
    2         DO NOT INCLUDE STACK DOWNWASH CALCULATIONS                  1
    3         DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS              1
    4         CALCULATE INITIAL PLUME SIZE                                0
                         INPUT OPTIONS
    5         READ MET DATA FROM CARDS                                    0
    6         READ HOURLY EMISSIONS                                       0
    7         SPECIFY SIGNIFICANT SOURCES                                 0
    8         READ RADIAL DISTANCES TO GENERATE RECEPTORS                 1
                         PRINTED OUTPUT OPTIONS
    9         DELETE EMISSIONS WITH HEIGHT TABLE                          1
   10         DELETE MET DATA SUMMARY FOR AVG PERIOD                      1
   11         DELETE HOURLY CONTRIBUTIONS                                 1
   12         DELETE MET DATA ON HOURLY CONTRIBUTIONS                     1
   13         DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS          1
   14         DELETE HOURLY SUMMARY                                       1
   15         DELETE MET DATA ON HRLY SUMMARY                             1
   16         DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY                1
   17         DELETE AVG-PERIOD CONTRIBUTIONS                             1
   18         DELETE AVERAGING PERIOD SUMMARY                             1
   19         DELETE AVG CONCENTRATIONS AND HI-5 TABLES                   0
                         OTHER CONTROL AND OUTPUT OPTIONS
   20         RUN IS PART OF A SEGMENTED RUN                              0
   21         WRITE PARTIAL CONC TO DISK OR TAPE                          [illegible]
   22         WRITE HOURLY CONC TO DISK OR TAPE                           1
   23         WRITE AVG-PERIOD CONC TO DISK OR TAPE                       0
   24         PUNCH AVG-PERIOD CONC ONTO CARDS                            0
ANEMOMETER HEIGHT IS:      7.00
EXPONENTS FOR POWER- LAW WIND INCREASE WITH HEIGHT ARE: .10, .15, .20, .25, .30, .30
TERRAIN ADJUSTMENTS ARE:  .000, .000, .000, .000, .000, .000
```

EXAMPLE 3, PAGE 2

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                                         POINT SOURCE INFORMATION

 SOURCE                EAST     NORTH    SO2(G/SEC)   PART(G/SEC)  STACK   STACK     STACK     STACK     POTEN. IMPACT    EFF      GRD-LVL   BUOY FLUX
                       COORD    COORD    EMISSIONS    EMISSIONS    HT(M)  TEMP(K) DIAM(M)VEL (M/SEC)(MICRO G/M**3)  HT(M)      ELEV         F
                       (USER UNITS)                                                                                        USER HT   M**4/S**3
                                                                                                                            UNITS

 1 STACK #1             .00      .00       36.22          .00       83.2    428.0      3.1      19.8          20.97      333.12     150.00     139.69
 2 STACK #2             .00      .00     1395.20          .00       70.7    462.0      4.0      28.2         339.94      538.01     150.00     396.43
 3 STACK #3             .00      .00     1086.10          .00      114.3    415.0      3.3      28.8         359.83      453.79     150.00     232.69
 4 STACK #4             .00      .00     3830.90          .00      247.8    405.0      5.0      33.8         296.86      956.50     150.00     801.08

SIGNIFICANT SO2  POINT SOURCES

     RANK           CHI-MAX     SOURCE NO.
               (MICROGRAMS/M**3)

       1             359.83        3
       2             339.94        2
       3             296.86        4
       4              20.97        1

                     ADDITIONAL INFORMATION ON SOURCES.

 EMISSION INFORMATION FOR    4 (NPT) POINT SOURCES HAS BEEN INPUT
  4 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
    3    2    4    1
SURFACE MET DATA FROM STATION(ISFCD)  93814, YEAR(ISFCYR) 1964
MIXING HEIGHT DATA FROM STATION(IMXD)  93815, YEAR(IMXYR) 1964

                 RECEPTOR INFORMATION

MPTER INTERNALLY GENERATES 36 RECEPTORS ON A CIRCLE CORRESPONDING TO EACH NON-ZERO RADIAL DISTANCE FROM A CENTER POINT
          COORDINATES ARE (USER UNITS): (     .000,    .000)
          RADIAL DISTANCE(S) USER SPECIFIED (USER UNITS):         .900        1.500        2.000        3.800        6.200

RECEPTOR     IDENTIFICATION  EAST      NORTH      RECEPTOR HT      RECEPTOR GROUND LEVEL
                             COORD     COORD  ABV LOCAL GRD LVL        ELEVATION
                             (USER UNITS)          (METERS)          (USER HT UNITS)

   1             10.   .9    .156      .886          .0                169.6
   2             20.   .9    .308      .846          .0                167.6
   3             30.   .9    .450      .779          .0                160.9
   4 *           40.   .9    .579      .689          .0                160.8
   5 *           50.   .9    .689      .579          .0                140.8
   6 *           60.   .9    .779      .450          .0                146.7
   7 *           70.   .9    .846      .308          .0                143.7
   8 *           80.   .9    .886      .156          .0                143.7
   9 *           90.   .9    .900      .000          .0                138.7
  10 *          100.   .9    .886     -.156          .0                138.7
  11 *          110.   .9    .846     -.308          .0                138.7
  12 *          120.   .9    .779     -.450          .0                138.7
  13            130.   .9    .689     -.579          .0                158.5
  14            140.   .9    .579     -.689          .0                185.6
  15            150.   .9    .450     -.779          .0                213.9
  16            160.   .9    .308     -.846          .0                213.8
 17        170,  .9       .156    -.886      .0        182.9
 18        180,  .9       .000    -.900      .0        155.4
 19 *      190,  .9      -.156    -.886      .0        183.3
 20 *      200,  .9      -.308    -.846      .0        178.7
 21 *      210,  .9      -.450    -.779      .0        178.7
 22 *      220,  .9      -.579    -.689      .0        178.7
 23 *      230,  .9      -.689    -.579      .0        178.7
 24 *      240,  .9      -.779    -.450      .0        180.2
 25 *      250,  .9      -.846    -.308      .0        180.2
 26 *      260,  .9      -.886    -.156      .0        183.3
 27 *      270,  .9      -.900     .000      .0        186.3
 28        280,  .9      -.886     .156      .0        152.4
 29        290,  .9      -.846     .308      .0        161.5
 30        300,  .9      -.779     .450      .0        185.9
 31        310,  .9      -.689     .579      .0        219.5
 32        320,  .9      -.579     .689      .0        205.7
 33        330,  .9      -.450     .779      .0        192.0
 34        340,  .9      -.308     .846      .0        179.8
 35        350,  .9      -.156     .886      .0        170.7
 36        360,  .9       .000     .900      .0        164.6
 37         10, 1.5       .260    1.477      .0        152.4
 38         20, 1.5       .513    1.410      .0        167.6
 39         30, 1.5       .750    1.299      .0        187.5
 40         40, 1.5       .964    1.149      .0        219.5
 41         50, 1.5      1.149     .964      .0        207.3
 42         60, 1.5      1.299     .750      .0        167.6
 43 *       70, 1.5      1.410     .513      .0        186.3
 44 *       80, 1.5      1.477     .260      .0        178.7
 45 *       90, 1.5      1.500     .000      .0        178.7
 46 *      100, 1.5      1.477    -.260      .0        178.7
 47        110, 1.5      1.410    -.513      .0        185.9
 48        120, 1.5      1.299    -.750      .0        201.2
 49        130, 1.5      1.149    -.964      .0        179.8
 50        140, 1.5       .964   -1.149      .0        219.5
 51        150, 1.5       .750   -1.299      .0        170.7
 52        160, 1.5       .513   -1.410      .0        161.5
 53        170, 1.5       .260   -1.477      .0        219.5
 54        180, 1.5       .000   -1.500      .0        198.1
 55 *      190, 1.5      -.260   -1.477      .0        183.3
 56        200, 1.5      -.513   -1.410      .0        182.6
 57        210, 1.5      -.750   -1.299      .0        219.5
 58        220, 1.5      -.964   -1.149      .0        213.4
 59 *      230, 1.5     -1.149    -.964      .0        178.7
 60 *      240, 1.5     -1.299    -.750      .0        178.7
 61 *      250, 1.5     -1.410    -.513      .0        180.2
 62 *      260, 1.5     -1.477    -.260      .0        180.2
 63 *      270, 1.5     -1.500     .000      .0        180.2
 64 *      280, 1.5     -1.477     .260      .0        181.7
 65 *      290, 1.5     -1.410     .513      .0        184.8
 66 *      300, 1.5     -1.299     .750      .0        180.2
 67 *      310, 1.5     -1.149     .964      .0        180.2
 68 *      320, 1.5      -.964    1.149      .0        180.2
 69 *      330, 1.5      -.750    1.299      .0        183.3
 70 *      340, 1.5      -.513    1.410      .0        180.2
 71 *      350, 1.5      -.260    1.477      .0        180.2
 72 *      360, 1.5       .000    1.500      .0        180.2
 73 *       10, 2.0       .347    1.970      .0        183.3
 74        20, 2.0      .684     1.879      .0       175.3
 75        30, 2.0     1.000     1.732      .0       190.5
 76        40, 2.0     1.286     1.532      .0       195.1
 77        50, 2.0     1.532     1.286      .0       198.1
 78        60, 2.0     1.732     1.000      .0       176.9
 79 *      70, 2.0     1.879      .684      .0       138.7
 80 *      80, 2.0     1.970      .347      .0       138.7
 81 *      90, 2.0     2.000      .000      .0       186.3
 82       100, 2.0     1.970     -.347      .0       185.9
 83       110, 2.0     1.879     -.684      .0       219.5
 84       120, 2.0     1.732    -1.000      .0       201.2
 85       130, 2.0     1.532    -1.286      .0       179.8
 86       140, 2.0     1.286    -1.532      .0       219.5
 87       150, 2.0     1.000    -1.732      .0       170.7
 88       160, 2.0      .684    -1.879      .0       164.6
 89       170, 2.0      .347    -1.970      .0       167.6
 90       180, 2.0      .000    -2.000      .0       176.8
 91       190, 2.0     -.347    -1.970      .0       198.1
 92       200, 2.0     -.684    -1.879      .0       204.2
 93       210, 2.0    -1.000    -1.732      .0       219.5
 94       220, 2.0    -1.286    -1.532      .0       219.5
 95       230, 2.0    -1.532    -1.286      .0       150.9
 96 *     240, 2.0    -1.732    -1.000      .0       138.7
 97 *     250, 2.0    -1.879     -.684      .0       183.3
 98 *     260, 2.0    -1.970     -.347      .0       140.2
 99 *     270, 2.0    -2.000      .000      .0       138.7
100 *     280, 2.0    -1.970      .347      .0       138.7
101 *     290, 2.0    -1.879      .684      .0       180.2
102 *     300, 2.0    -1.732     1.000      .0       180.2
103 *     310, 2.0    -1.532     1.286      .0       183.3
104 *     320, 2.0    -1.286     1.532      .0       183.3
105 *     330, 2.0    -1.000     1.732      .0       183.3
106 *     340, 2.0     -.684     1.879      .0       183.3
107 *     350, 2.0     -.347     1.970      .0       183.3
108 *     360, 2.0      .000     2.000      .0       183.3
109        10, 3.8      .660     3.742      .0       155.4
110        20, 3.8     1.300     3.571      .0       201.2
111        30, 3.8     1.900     3.291      .0       216.4
112        40, 3.8     2.443     2.911      .0       219.5
113 *      50, 3.8     2.911     2.443      .0       138.7
114 *      60, 3.8     3.291     1.900      .0       149.4
115 *      70, 3.8     3.571     1.300      .0       183.3
116        80, 3.8     3.742      .660      .0       219.5
117        90, 3.8     3.800      .000      .0       219.5
118       100, 3.8     3.742     -.660      .0       219.5
119       110, 3.8     3.571    -1.300      .0       219.5
120       120, 3.8     3.291    -1.900      .0       219.5
121       130, 3.8     2.911    -2.443      .0       219.5
122       140, 3.8     2.443    -2.911      .0       219.5
123       150, 3.8     1.900    -3.291      .0       219.5
124       160, 3.8     1.300    -3.571      .0       219.5
125       170, 3.8      .660    -3.742      .0       219.5
126       180, 3.8      .000    -3.800      .0       219.5
127       190, 3.8     -.660    -3.742      .0       219.5
128       200, 3.8    -1.300    -3.571      .0       185.9
129       210, 3.8    -1.900    -3.291      .0       179.6
130       220, 3.8    -2.443    -2.911      .0       185.9
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   131 *          230, 3.8          -2.911   -2.443        .0                 180.2
   132 *          240, 3.8          -3.291   -1.900        .0                 180.2
   133 *          250, 3.8          -3.571   -1.300        .0                 186.3
   134 *          260, 3.8          -3.742    -.660        .0                 180.2
   135 *          270, 3.8          -3.800     .000        .0                 180.2
   136 *          280, 3.8          -3.742     .660        .0                 183.3
   137 *          290, 3.8          -3.571    1.300        .0                 186.3
   138 *          300, 3.8          -3.291    1.900        .0                 189.8
   139 *          310, 3.8          -2.911    2.443        .0                 189.8
   140 *          320, 3.8          -2.443    2.911        .0                 186.3
   141 *          330, 3.8          -1.900    3.291        .0                 183.3
   142 *          340, 3.8          -1.300    3.571        .0                 183.3
   143 *          350, 3.8           -.660    3.742        .0                 186.3
   144 *          360, 3.8            .000    3.800        .0                 186.3
   145 *           10, 6.2           1.077    6.106        .0                 180.2
   146 *           20, 6.2           2.121    5.826        .0                 180.2
   147 *           30, 6.2           3.100    5.369        .0                 180.2
   148             40, 6.2           3.985    4.749        .0                 164.6
   149             50, 6.2           4.749    3.985        .0                 152.8
   150 *           60, 6.2           5.369    3.100        .0                 186.3
   151             70, 6.2           5.826    2.121        .0                 219.5
   152             80, 6.2           6.106    1.077        .0                 219.5
   153             90, 6.2           6.200     .000        .0                 219.5
   154            100, 6.2           6.106   -1.077        .0                 219.5
   155            110, 6.2           5.826   -2.121        .0                 219.5
   156            120, 6.2           5.369   -3.100        .0                 219.5
   157            130, 6.2           4.749   -3.985        .0                 219.5
   158            140, 6.2           3.985   -4.749        .0                 219.5
   159            150, 6.2           3.100   -5.369        .0                 219.5
   160            160, 6.2           2.121   -5.826        .0                 219.5
   161            170, 6.2           1.077   -6.106        .0                 219.5
   162            180, 6.2            .000   -6.200        .0                 219.5
   163            190, 6.2          -1.077   -6.106        .0                 213.8
   164            200, 6.2          -2.121   -5.826        .0                 219.5
   165            210, 6.2          -3.100   -5.369        .0                 219.5
   166            220, 6.2          -3.985   -4.749        .0                 158.5
   167 *          230, 6.2          -4.749   -3.985        .0                 139.7
   168 *          240, 6.2          -5.369   -3.100        .0                 180.2
   169            250, 6.2          -5.826   -2.121        .0                 170.7
   170            260, 6.2          -6.106   -1.077        .0                 219.5
   171            270, 6.2          -6.200     .000        .0                 155.8
   172 *          280, 6.2          -6.106    1.077        .0                 138.7
   173 *          290, 6.2          -5.826    2.121        .0                 183.3
   174            300, 6.2          -5.369    3.100        .0                 158.5
   175            310, 6.2          -4.749    3.985        .0                 167.6
   176            320, 6.2          -3.985    4.749        .0                 219.5
   177            330, 6.2          -3.100    5.369        .0                 198.1
   178            340, 6.2          -2.121    5.826        .0                 189.0
   179            350, 6.2          -1.077    6.106        .0                 183.8
   180 *          360, 6.2            .000    6.200        .0                 186.3

 * ONE ASTERISK INDICATES THAT THE ASSOCIATED RECEPTOR(S) HAVE A GROUND LEVEL ELEVATION LOWER THAN THE LOWEST SOURCE BASE ELEVATION.
CAUTION SHOULD BE USED IN INTERPRETING CONCENTRATIONS FOR THESE RECEPTORS.
**  TWO ASTERISKS INDICATE THAT THE ASSOCIATED RECEPTOR(S) HAVE GROUND LEVEL ELEVATIONS ABOVE THE LOWEST STACK TOP.
    CONSEQUENTLY NO CALCULATIONS WILL BE PERFORMED WITH THIS RECEPTOR.A SERIES OF ASTERISKS WILL INSTEAD APPEAR IN THE OUTPUT.
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                                         MPTER - VERSION 79365
MPTER RUN FOR 366 DAYS OF DATA
MET DATA READ OF UNIT 11, HRLY CONCS WRITTEN TO UNIT 12
DATA INPUT BY TOM PIERCE      10 FEBRUARY 1980

              RECEPTORS

RECEPTOR    IDENTIFICATION  EAST      NORTH     RECEPTOR HT        RECEPTOR GROUND LEVEL                AVG CONC FOR PERIOD
                            COORD     COORD   ABV LOCAL GRD LVL       ELEVATION                 DAY  1 HR 1. TO DAY366.HR 1.
                            (USER UNITS)          (METERS)          (USER HT UNITS)                     (MICROGRAMS/M**3)

    1          10,  .9         .16       .89          .0               164.6                               1.46
    2          20,  .9         .31       .85          .0               167.6                               1.24
    3          30,  .9         .45       .78          .0               169.2                                .90
    4          40,  .9         .58       .69          .0               149.4                                .69
    5          50,  .9         .69       .58          .0               149.4                                .81
    6          60,  .9         .78       .45          .0               146.3                                .86
    7          70,  .9         .85       .31          .0               143.3                                .73
    8          80,  .9         .89       .16          .0               143.3                                .55
    9          90,  .9         .90       .00          .0               138.7                                .41
   10         100,  .9         .89      -.16          .0               138.7                                .38
   11         110,  .9         .85      -.31          .0               138.7                                .49
   12         120,  .9         .78      -.45          .0               138.7                                .93
   13         130,  .9         .69      -.58          .0               158.5                               1.75
   14         140,  .9         .58      -.69          .0               185.9                               2.27
   15         150,  .9         .45      -.78          .0               213.4                               2.32
   16         160,  .9         .31      -.85          .0               213.4                               1.67
   17         170,  .9         .16      -.89          .0               182.9                                .59
   18         180,  .9         .00      -.90          .0               155.4                                .34
   19         190,  .9        -.16      -.89          .0               143.3                                .32
   20         200,  .9        -.31      -.85          .0               138.7                                .41
   21         210,  .9        -.45      -.78          .0               138.7                                .74
   22         220,  .9        -.58      -.69          .0               138.7                               1.27
   23         230,  .9        -.69      -.58          .0               138.7                               1.76
   24         240,  .9        -.78      -.45          .0               140.2                               1.85
   25         250,  .9        -.85      -.31          .0               140.2                               1.55
   26         260,  .9        -.89      -.16          .0               143.3                               1.28
   27         270,  .9        -.90       .00          .0               146.3                               1.10
   28         280,  .9        -.89       .16          .0               152.4                                .79
   29         290,  .9        -.85       .31          .0               161.5                                .47
   30         300,  .9        -.78       .45          .0               185.9                                .60
   31         310,  .9        -.69       .58          .0               219.5                               1.84
   32         320,  .9        -.58       .69          .0               205.7                               1.85
   33         330,  .9        -.45       .78          .0               192.0                               1.37
   34         340,  .9        -.31       .85          .0               179.8                               1.00
   35         350,  .9        -.16       .89          .0               170.7                               1.25
   36         360,  .9         .00       .90          .0               164.6                               1.56
   37          10, 1.5         .26      1.48          .0               152.4                               2.42
   38          20, 1.5         .51      1.41          .0               167.6                               3.89
   39          30, 1.5         .75      1.30          .0               187.5                               7.07
   40          40, 1.5         .96      1.15          .0               219.5                              18.77
   41          50, 1.5        1.15       .96          .0               207.3                              12.19
   42          60, 1.5        1.30       .75          .0               167.6                               6.28
   43          70, 1.5        1.41       .51          .0               146.3                               4.79
   44          80, 1.5        1.48       .26          .0               138.7                               3.00
   45          90, 1.5        1.50       .00          .0               138.7                               1.88
   46         100, 1.5        1.48      -.26          .0               138.7                               1.50
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 47     110, 1.5     1.41    -.51    .0      185.9        4.11
 48     120, 1.5     1.30    -.75    .0      201.2        6.67
 49     130, 1.5     1.15    -.96    .0      179.8        4.74
 50     140, 1.5      .96   -1.15    .0      219.5        8.86
 51     150, 1.5      .75   -1.30    .0      170.7        2.97
 52     160, 1.5      .51   -1.41    .0      161.5        2.13
 53     170, 1.5      .26   -1.48    .0      219.5        5.33
 54     180, 1.5      .00   -1.50    .0      198.1        3.00
 55     190, 1.5     -.26   -1.48    .0      183.3        1.27
 56     200, 1.5     -.51   -1.41    .0      182.9        2.86
 57     210, 1.5     -.75   -1.30    .0      219.5        5.82
 58     220, 1.5     -.96   -1.15    .0      213.4        6.21
 59     230, 1.5    -1.15    -.96    .0      138.7        3.53
 60     240, 1.5    -1.30    -.75    .0      138.7        3.92
 61     250, 1.5    -1.41    -.51    .0      180.2        3.42
 62     260, 1.5    -1.48    -.26    .0      180.2        2.57
 63     270, 1.5    -1.50     .00    .0      180.2        2.56
 64     280, 1.5    -1.48     .26    .0      181.7        2.51
 65     290, 1.5    -1.41     .51    .0      188.8        1.98
 66     300, 1.5    -1.30     .75    .0      180.2        1.68
 67     310, 1.5    -1.15     .96    .0      180.2        2.04
 68     320, 1.5     -.96    1.15    .0      180.2        2.38
 69     330, 1.5     -.75    1.30    .0      183.3        2.10
 70     340, 1.5     -.51    1.41    .0      180.2        1.75
 71     350, 1.5     -.26    1.48    .0      180.2        1.90
 72     360, 1.5      .00    1.50    .0      180.2        2.06
 73      10, 2.0      .35    1.97    .0      183.3        3.22
 74      20, 2.0      .68    1.88    .0      175.3        6.96
 75      30, 2.0     1.00    1.73    .0      190.5       12.22
 76      40, 2.0     1.29    1.53    .0      195.1       14.56
 77      50, 2.0     1.53    1.29    .0      198.1       14.07
 78      60, 2.0     1.73    1.00    .0      176.8       10.87
 79      70, 2.0     1.88     .68    .0      138.7        7.26
 80      80, 2.0     1.97     .35    .0      138.7        4.97
 81      90, 2.0     2.00     .00    .0      186.3        3.56
 82     100, 2.0     1.97    -.35    .0      185.9        5.28
 83     110, 2.0     1.88    -.68    .0      219.5       13.83
 84     120, 2.0     1.73   -1.00    .0      201.2        9.47
 85     130, 2.0     1.53   -1.29    .0      179.8        6.29
 86     140, 2.0     1.29   -1.53    .0      219.5       11.03
 87     150, 2.0     1.00   -1.73    .0      170.7        4.12
 88     160, 2.0      .68   -1.88    .0      164.6        3.39
 89     170, 2.0      .35   -1.97    .0      167.6        3.36
 90     180, 2.0      .00   -2.00    .0      176.8        3.28
 91     190, 2.0     -.35   -1.97    .0      198.1        4.71
 92     200, 2.0     -.68   -1.88    .0      208.2        6.10
 93     210, 2.0    -1.00   -1.73    .0      219.5        7.39
 94     220, 2.0    -1.29   -1.53    .0      219.5        8.41
 95     230, 2.0    -1.53   -1.29    .0      150.9        4.79
 96     240, 2.0    -1.73   -1.00    .0      138.7        5.07
 97     250, 2.0    -1.88    -.68    .0      183.3        4.57
 98     260, 2.0    -1.97    -.35    .0      180.2        3.19
 99     270, 2.0    -2.00     .00    .0      138.7        3.40
100     280, 2.0    -1.97     .35    .0      138.7        3.47
101     290, 2.0    -1.88     .68    .0      180.2        3.03
102     300, 2.0    -1.73    1.00    .0      180.2        2.94
103     310, 2.0    -1.53    1.29    .0      183.3        3.34
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104        320, 2.0      -1.29     1.53      .0        143.3                     3.67
105        330, 2.0      -1.00     1.73      .0        143.3                     3.11
106        340, 2.0       -.68     1.88      .0        143.3                     2.64
107        350, 2.0       -.35     1.97      .0        143.3                     2.76
108        360, 2.0        .00     2.00      .0        143.3                     2.02
109         10, 3.8        .66     3.74      .0        155.4                     5.02
110         20, 3.8       1.30     3.57      .0        201.2                    17.50
111         30, 3.8       1.90     3.29      .0        216.4                    32.54
112         40, 3.8       2.44     2.91      .0        219.5                 *  34.15
113         50, 3.8       2.91     2.44      .0        138.7                     9.30
114         60, 3.8       3.29     1.90      .0        149.4                    11.13
115         70, 3.8       3.57     1.30      .0        143.3                    11.68
116         80, 3.8       3.74      .66      .0        219.5                    21.00
117         90, 3.8       3.80      .00      .0        219.5                    19.03
118        100, 3.8       3.74     -.66      .0        219.5                    14.00
119        110, 3.8       3.57    -1.30      .0        219.5                    10.16
120        120, 3.8       3.29    -1.90      .0        219.5                    17.78
121        130, 3.8       2.91    -2.44      .0        219.5                    15.10
122        140, 3.8       2.44    -2.91      .0        219.5                    13.34
123        150, 3.8       1.90    -3.29      .0        219.5                    11.02
124        160, 3.8       1.30    -3.57      .0        219.5                    10.30
125        170, 3.8        .66    -3.74      .0        219.5                     9.38
126        180, 3.8        .00    -3.80      .0        219.5                     9.03
127        190, 3.8       -.66    -3.74      .0        219.5                     9.35
128        200, 3.8      -1.30    -3.57      .0        185.9                     6.44
129        210, 3.8      -1.90    -3.29      .0        179.8                     5.54
130        220, 3.8      -2.44    -2.91      .0        185.9                     6.40
131        230, 3.8      -2.91    -2.44      .0        140.2                     5.47
132        240, 3.8      -3.29    -1.90      .0        140.2                     6.86
133        250, 3.8      -3.57    -1.30      .0        146.7                     5.89
134        260, 3.8      -3.74     -.66      .0        140.2                     3.00
135        270, 3.8      -3.80      .00      .0        140.2                     4.38
136        280, 3.8      -3.74      .66      .0        143.3                     4.41
137        290, 3.8      -3.57     1.30      .0        146.7                     4.55
138        300, 3.8      -3.29     1.90      .0        149.4                     5.07
139        310, 3.8      -2.91     2.44      .0        149.4                     4.06
140        320, 3.8      -2.44     2.91      .0        146.7                     5.30
141        330, 3.8      -1.90     3.29      .0        143.3                     4.77
142        340, 3.8      -1.30     3.57      .0        143.3                     4.16
143        350, 3.8       -.66     3.74      .0        146.3                     4.30
144        360, 3.8        .00     3.80      .0        146.7                     5.01
145         10, 6.2       1.08     6.11      .0        140.2                     5.43
146         20, 6.2       2.12     5.83      .0        140.2                     8.75
147         30, 6.2       3.10     5.37      .0        140.2                    11.52
148         40, 6.2       3.99     4.75      .0        164.6                    15.32
149         50, 6.2       4.75     3.99      .0        152.4                    10.59
150         60, 6.2       5.37     3.10      .0        146.7                    10.50
151         70, 6.2       5.83     2.12      .0        219.5                    22.06
152         80, 6.2       6.11     1.08      .0        219.5                    17.05
153         90, 6.2       6.20      .00      .0        219.5                    16.88
154        100, 6.2       6.11    -1.08      .0        219.5                    12.01
155        110, 6.2       5.83    -2.12      .0        219.5                    15.71
156        120, 6.2       5.37    -3.10      .0        219.5                    15.62
157        130, 6.2       4.75    -3.90      .0        219.5                    13.46
158        140, 6.2       3.99    -4.75      .0        219.5                    11.60
159        150, 6.2       3.10    -5.37      .0        219.5                     9.72
160        160, 6.2       2.12    -5.83      .0        219.5                     6.28
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 161      170., 6.2      1.08    -6.11      .0          219.5                         8.72
 162      180., 6.2       .00    -6.20      .0          219.5                         8.59
 163      190., 6.2     -1.08    -6.11      .0          213.4                         8.23
 164      200., 6.2     -2.12    -5.83      .0          219.5                         9.35
 165      210., 6.2     -3.10    -5.37      .0          219.5                         7.34
 166      220., 6.2     -3.99    -4.75      .0          158.5                         4.70
 167      230., 6.2     -4.75    -3.99      .0          178.7                         5.05
 168      240., 6.2     -5.37    -3.10      .0          180.2                         6.34
 169      250., 6.2     -5.83    -2.12      .0          170.7                         6.31
 170      260., 6.2     -6.11    -1.08      .0          219.5                         9.53
 171      270., 6.2     -6.20      .00      .0          155.4                         4.10
 172      280., 6.2     -6.11     1.08      .0          178.7                         3.54
 173      290., 6.2     -5.83     2.12      .0          183.7                         3.91
 174      300., 6.2     -5.37     3.10      .0          158.5                         5.09
 175      310., 6.2     -4.75     3.99      .0          167.6                         5.19
 176      320., 6.2     -3.99     4.75      .0          219.5                        10.26
 177      330., 6.2     -3.10     5.37      .0          198.1                         7.89
 178      340., 6.2     -2.12     5.83      .0          189.0                         5.65
 179      350., 6.2     -1.08     6.11      .0          182.0                         5.50
 180      360., 6.2       .00     6.20      .0          186.7                         5.15

                     FIVE HIGHEST 1-HOUR SO2 CONCENTRATIONS(ENDING ON JULIAN DAY, HOUR)
                                     (MICROGRAMS/M**3)
RECEPTOR
                             1                     2                     3                     4                     5

  1(  .16,   .89)  1921.54 (139,11)  1759.14 (209,13)  1716.91 (164,11)  1612.90 (199,13)  1502.48 (199,11)
  2(  .31,   .85)  1943.68 (139,11)  1735.63 (164,11)  1675.12 (207,12)   891.12 (139,12)   649.72 (209,13)
  3(  .45,   .78)  1789.76 (207,12)  1011.13 (139,12)   882.07 (139,11)   751.05 (164,11)   534.57 (185,14)
  4(  .58,   .69)  1543.57 (185,14)   823.68 (207,12)   739.09 (182,13)   482.45 (139,12)   199.61 (160,14)
  5(  .69,   .58)  2073.02 (185,14)   950.98 (142,13)   763.33 (198,12)   543.44 (174,11)   297.25 (174,13)
  6(  .78,   .45)  1759.64 (198,12)  1310.56 (185,14)   961.07 (174,11)   513.86 (142,13)   264.25 (174,13)
  7(  .85,   .31)  1871.91 (198,12)   739.05 (174,11)   351.60 (195,14)   320.45 (219,13)   284.65 (247,12)
  8(  .89,   .16)   983.89 (198,12)   884.63 (176,12)   847.87 (219,13)   233.10 (174,11)   195.73 (210,14)
  9(  .90,   .00)  1731.47 (136,12)   901.00 (219,13)   182.53 (198,12)   111.05 (210,14)    89.84 (205,11)
 10(  .89,  -.16)  1607.16 (136,12)   648.42 (205,11)   410.61 (219,13)   113.90 (223,13)    92.42 (247,14)
 11(  .85,  -.31)  1659.09 (205,11)   680.95 (136,12)   315.11 (176,11)   258.47 (247,14)   218.10 (185,12)
 12(  .78,  -.45)  1924.26 (205,11)  1202.42 (136,11)   949.11 (185,13)   986.90 (185,12)   797.21 (187,11)
 13(  .69,  -.58)  2042.40 (136,11)  2032.43 (185,13)  1862.62 (187,11)  1783.56 (185,12)  1600.84 (203,12)
 14(  .58,  -.69)  2369.69 (203,12)  2093.85 (185,13)  2066.00 (187,11)  2020.61 (142,12)  1664.65 (136,11)
 15(  .45,  -.78)  2330.71 (150,11)  2232.67 (142,12)  2017.06 (203,11)  1678.66 (203,12)  1324.75 (142,14)
 16(  .31,  -.85)  1507.55 (150,11)  1339.64 (203,11)  1963.65 (182,12)  1041.10 (142,14)   813.12 (135,13)
 17(  .16,  -.89)   837.31 (208,13)   580.29 (150,12)   369.80 (150,11)   360.74 (203,11)   360.12 (179,14)
 18(  .00,  -.90)  1625.71 (208,13)   351.72 (150,12)   143.23 (179,11)   114.44 (163,14)    94.87 (168,14)
 19( -.16,  -.89)  1542.87 (208,13)   652.30 (163,14)    89.13 (168,14)    69.75 (150,12)    67.05 (204,12)
 20( -.31,  -.85)  1424.36 (163,14)   679.71 (208,13)   513.35 (204,12)   266.84 (146,13)   120.15 (177,14)
 21( -.45,  -.78)  1424.36 (163,14)  1364.42 (204,12)  1097.32 (146,13)   637.68 (228,13)   456.58 (207,14)
 22( -.58,  -.69)  1861.82 (146,13)  1591.66 (204,12)  1424.35 (228,13)  1327.16 (207,14)  1105.91 (201,11)
 23( -.69,  -.58)  1767.52 (222,13)  1671.95 (207,14)  1631.40 (201,11)  1489.65 (146,13)  1424.35 (228,13)
 24( -.78,  -.45)  1817.70 (183,14)  1651.12 (222,13)  1619.27 (202,11)  1585.13 (178,13)  1533.45 (115,13)
 25( -.85,  -.31)  1864.58 (177,11)  1817.70 (183,14)  1306.67 (115,13)  1187.90 (202,11)  1061.87 (179,12)
 26( -.89,  -.16)  1966.74 (179,12)  1839.98 (208,13)  1494.08 (206,13)  1401.34 (177,11)   974.91 (227,12)
 27( -.90,   .00)  1861.71 (204,13)  1812.62 (227,12)  1717.69 (179,12)  1634.07 (206,13)   463.85 (177,11)
 28( -.89,   .16)  1601.62 (227,12)   890.15 (208,13)   869.18 (213,14)   826.58 (206,13)   694.58 (179,12)
 29( -.85,   .31)   990.00 (213,14)   653.74 (227,12)   288.79 (180,11)   273.36 (193,14)   167.35 (204,13)
 30( -.78,   .45)   525.04 (213,14)   484.89 (125,12)   403.59 (201,12)   354.47 (164,13)   349.54 (180,11)
 31( -.69,   .58)  1792.46 (125,12)  1583.44 (164,13)  1581.74 (201,12)   911.78 (214,13)   721.89 (169,11)
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32( -.58,   .69)   2500.09 (164,13) * 2444.12 (125,12)   2172.57 (201,12)   2130.00 (214,13)    687.10 (213,12)
33( -.45,   .78)   2380.18 (214,13)   1919.98 (168,13)   1619.06 (125,12)   1912.12 (201,12)    965.01 (174,14)
34( -.31,   .85)   1239.18 (214,13)   1224.87 (178,14)    908.31 (178,14)    788.59 (209,14)    673.47 (164,13)
35( -.16,   .89)   1902.37 (209,14)   1538.86 (199,11)   1822.34 (199,13)   1346.76 (193,11)   1335.89 (209,13)
36(  .00,   .90)   2188.93 (209,13)   2169.57 (199,11)   2161.76 (199,13)   2149.88 (209,14)   1780.10 (193,11)
37(  .26,  1.48)   2608.48 (164,11)   1339.38 (139,11)   1233.62 (193,11)   1181.98 (209,13)   1046.63 (199,13)
38(  .51,  1.41)   2608.83 (164,11)   1658.90 (139,12)   1462.50 (207,12)   1347.64 (139,11)    946.39 (164,12)
39(  .75,  1.30)   1958.78 (139,12)   1589.76 (207,12)   1285.64 (112,12)   1197.13 (197,12)   1195.89 (164,11)
40(  .96,  1.15)   2177.10 (161,12)   2108.22 (142,13)   1855.03 (210,13)   1780.21 (145,15)   1772.35 (317,14)
41( 1.15,   .96)   2651.76 (142,13)   1668.37 (161,13)   1629.22 (185,14)   1595.46 (160,12)   1577.57 (178,13)
42( 1.30,   .75)   1570.09 (174,11)   1518.19 (142,13)   1517.50 (198,12)   1443.37 (174,13)   1276.78 (247,12)
43( 1.41,   .51)   1738.05 (247,12)   1629.99 (198,12)   1249.59 (174,11)   1063.72 (219,13)    939.02 (139,14)
44( 1.48,   .26)   2578.25 (219,13)   1080.38 (247,12)    968.50 (136,12)    881.52 (210,14)    826.27 (215,13)
45( 1.50,   .00) * 2784.48 (219,13)   1947.32 (136,12)    633.14 (156,14)    590.43 (156,12)    570.20 (210,14)
46( 1.48,  -.26)   1805.85 (136,12)   1363.39 (219,13)    926.35 (247,14)    690.59 (205,11)    633.14 (156,14)
47( 1.41,  -.51)   2217.16 (247,14)   1790.88 (205,11)   1267.98 (223,13)   1241.61 (155,11)   1078.48 (162,14)
48( 1.30,  -.75)   2236.75 (247,14)   2082.97 (205,11)   1546.14 (136,11)   1211.27 (176,12)   1192.18 (249,13)
49( 1.15,  -.96)   2840.67 (136,11)   1992.93 (198,14)   1914.90 (185,12)   1792.23 (203,12)   1480.89 (187,11)
50(  .96, -1.15)   2425.52 (203,12)   2032.25 (198,14)   1804.42 (136,11)   1709.99 (142,12)   1592.96 ( 91,15)
51(  .75, -1.30)   2300.84 (142,14)   1914.95 (150,11)   1701.94 (142,12)   1535.74 (203,12)   1286.27 (203,11)
52(  .51, -1.41)   1817.54 (142,14)   1210.43 (150,11)    815.23 (203,11)    779.69 (142,12)    776.26 (252,11)
53(  .26, -1.48)   1603.32 (179,14)   1574.65 (232,13)   1399.43 (179,11)   1379.28 (135,11)   1349.44 (150,12)
54(  .00, -1.50)   1567.17 (208,13)   1334.18 (150,12)   1171.22 (179,11)   1064.81 (221,12)   1033.60 (208,15)
55( -.26, -1.48)   1522.97 (208,13)    809.59 (163,14)    713.27 (168,14)    565.40 (150,15)    507.87 (243,15)
56( -.51, -1.41)   1789.60 (163,14)   1108.99 (151,13)   1005.25 (177,14)    936.40 (163,13)    807.05 (141,13)
57( -.75, -1.30)   1805.50 (163,14)   1574.65 (221,10)   1555.18 (177,14)   1512.38 (179,16)   1463.59 (204,12)
58( -.96, -1.15)   1688.59 (204,12)   1663.75 (153,13)   1557.35 (228,13)   1507.66 (201,11)   1495.01 (163,12)
59(-1.15,  -.96)   2186.32 (201,11)   1939.17 (207,15)   1610.51 (136,13)   1595.23 (222,13)   1589.04 (207,14)
60(-1.30,  -.75)   2699.75 (115,13)   2186.11 (136,13)   1952.19 (202,11)   1657.91 (207,15)   1641.94 (178,13)
61(-1.41,  -.51)   2321.42 (115,13)   1740.38 (177,11)   1440.72 (202,11)   1378.01 (136,13)   1279.13 (143,14)
62(-1.48,  -.26)   1805.72 (178,16)   1420.32 (206,13)   1352.19 (179,12)   1286.06 (177,11)   1279.30 (204,13)
63(-1.50,   .00)   2121.21 (178,16)   1843.62 (208,14)   1526.58 (206,13)   1412.99 (227,12)   1279.30 (204,13)
64(-1.48,   .26)   2077.26 (213,14)   1846.35 (208,14)   1220.55 (227,12)   1094.38 (178,16)    831.44 (169,12)
65(-1.41,   .51)   2246.88 (213,14)    885.58 (180,11)    860.18 (193,14)    814.23 (204,14)    666.88 (180,15)
66(-1.30,   .75)   1092.89 (213,14)    583.20 (229,13)    551.81 (124,12)    551.00 (180,11)    547.44 (180,15)
67(-1.15,   .96)   1280.63 (201,12)    997.14 (168,13)    992.21 (125,12)    738.30 (169,11)    725.97 (173,14)
68( -.96,  1.15)   1871.59 (201,12)   1700.79 (168,13)   1431.17 (125,12)   1212.00 (214,13)   1096.23 (201,10)
69( -.75,  1.30)   1495.28 (174,14)   1403.77 (214,13)   1357.90 (164,13)   1282.01 (201,12)    993.74 (125,12)
70( -.51,  1.41)   2201.64 (174,14)   1525.97 (178,14)    773.75 (214,13)    614.00 (125,13)    551.87 (125,15)
71( -.26,  1.48)   1914.04 (178,14)   1492.96 (178,14)   1435.91 (193,11)   1176.47 (209,14)   1029.05 (199,11)
72(  .00,  1.50)   1946.45 (193,11)   1489.78 (199,11)   1410.70 (209,13)   1384.65 (199,13)   1357.40 (209,14)
73(  .35,  1.97)   2019.44 (164,11)    951.77 (139,11)    939.27 (193,11)    929.89 (172,11)    814.96 (164,12)
74(  .68,  1.88)   2019.43 (164,11)   1269.81 (139,12)   1194.41 (126,12)   1148.81 (143,13)   1142.57 (164,12)
75( 1.00,  1.73)   1493.28 (139,12)   1348.07 (238,12)   1318.35 (112,12)   1314.20 (197,13)   1262.61 (209,16)
76( 1.29,  1.53)   1693.35 (142,13)   1446.78 (161,12)   1368.66 (210,13)   1328.07 (197,16)   1288.40 (160,14)
77( 1.53,  1.29)   2159.56 (142,13)   1454.39 (160,12)   1399.97 (161,13)   1363.57 (259,12)   1359.85 (139,15)
78( 1.73,  1.00)   1298.32 (230,12)   1227.12 (174,11)   1218.81 (182,13)   1201.25 (174,13)   1194.97 (143,12)
79( 1.88,   .68)   1451.81 (247,12)   1259.42 (198,12)   1057.05 (139,14)   1035.55 (210,10)    962.22 (174,11)
80( 1.97,   .35)   2067.51 (219,13)   1067.99 (215,12)   1057.37 (210,14)    994.61 (209,12)    950.67 (160,11)
81( 2.00,   .00)   2241.58 (219,13)   1514.59 (136,12)    919.37 (156,12)    883.67 (222,14)    873.90 (156,14)
82( 1.97,  -.35)   1396.97 (136,12)   1210.81 (140,12)   1108.33 (131,13)   1098.73 (156,14)   1083.20 (130,12)
83( 1.88,  -.68)   2179.10 (247,14)   1729.29 (162,14)   1599.16 (162,13)   1558.91 ( 20,15)   1527.59 (155,11)
84( 1.73, -1.00)   2178.67 (247,14)   1617.71 (205,11)   1407.35 (162,16)   1346.55 (249,13)   1303.32 (185,11)
85( 1.53, -1.29)   1898.46 (136,11)   1612.88 (198,14)   1485.52 (185,12)   1362.74 (203,12)   1318.85 (221,14)
86( 1.29, -1.53)   1886.10 (203,12)   1658.17 (148,13)   1658.17 (186,12)   1613.18 (198,14)   1567.65 ( 91,15)
87( 1.00, -1.73)   1909.81 (142,14)   1495.26 (150,11)   1317.94 (142,12)   1154.46 (203,12)   1111.18 (227,13)
88(  .68, -1.88)   1497.39 (142,14)   1029.20 (252,11)   1024.62 (291,11)    945.54 (244,11)    915.23 (150,11)
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 89(   .35,  -1.97)   1174.85  (179,14)   1059.74  (205,12)   1022.40  (179,11)   1018.42  (204,10)   1012.28  (150, 9)
 90(   .00,  -2.00)   1188.70  (208,15)   1093.57  (150,12)   1076.78  (179,11)   1074.06  (208,13)    997.27  (221,12)
 91(  -.35,  -1.97)   1404.76  (218,14)   1285.17  (168,14)   1218.90  (203,16)   1170.98  (243,15)   1161.86  (150,15)
 92(  -.68,  -1.88)   1400.78  (151,13)   1391.94  (141,13)   1389.33  (163,14)   1292.83  (163,13)   1207.01  (212,15)
 93( -1.00,  -1.73)   1679.62  (221,10)   1567.93  (179,16)   1492.48  (115,15)   1491.72  (222,12)   1449.30  (222,11)
 94( -1.29,  -1.53)   1667.65  (153,13)   1551.23  (163,12)   1539.16  (116,13)   1530.91  (245,13)   1528.68  (256,15)
 95( -1.53,  -1.29)   1726.54  (201,11)   1681.02  (207,15)   1249.45  (136,13)   1233.80  (222,13)   1096.31  (192,13)
 96( -1.73,  -1.00)   2101.81  (115,13)   1729.30  (136,13)   1538.94  (202,11)   1426.59  (207,15)   1192.99  (178,13)
 97( -1.88,   -.68)   1787.75  (115,13)   1356.44  (177,11)   1111.90  (202,11)   1058.49  (136,13)   1055.53  (212,13)
 98( -1.97,   -.35)   1829.56  (178,16)    980.05  (177,11)    924.60  (146,14)    903.52  (146,15)    890.19  (146,12)
 99( -2.00,    .00)   2153.38  (178,16)   1758.95  (204,14)   1029.17  (227,12)   1009.69  (178,15)    936.69  (206,13)
100( -1.97,    .35)   1758.85  (204,14)   1726.17  (213,14)   1106.11  (178,16)    993.82  (169,12)    971.42  (228,12)
101( -1.88,    .68)   1871.56  (213,14)   1004.18  (180,11)    992.94  (193,14)    955.12  (180,15)    939.09  (180,14)
102( -1.73,   1.00)    885.72  (213,14)    850.36  (229,13)    819.55  (124,12)    819.14  (180,15)    762.49  (285,12)
103( -1.53,   1.29)   1134.20  (173,14)   1003.03  (169,11)    972.36  (201,12)    929.04  (180,12)    911.36  (169,10)
104( -1.29,   1.53)   1461.55  (201,12)   1318.63  (164,13)    999.68  (125,12)    972.24  (213,13)    886.28  (213,12)
105( -1.00,   1.73)   1217.15  (174,14)   1033.98  (164,13)    981.95  (214,13)    972.36  (201,12)    954.58  (181,12)
106(  -.68,   1.88)   1824.95  (174,14)   1159.61  (178,14)    915.07  (125,13)    873.09  (169,16)    852.12  (214,14)
107(  -.35,   1.97)   1478.71  (178,14)   1217.15  (174,14)   1108.72  (193,11)    830.35  (277,12)    816.26  (125,15)
108(   .00,   2.00)   1534.55  (193,11)   1090.22  (199,11)    957.32  (209,13)    950.41  (169,15)    874.98  (164,11)
109(   .66,   3.74)   1133.32  (164,11)   1005.18  (172,11)    922.93  (265,10)    919.77  (139,10)    915.61  (126,11)
110(  1.30,   3.57)   1197.53  (164,15)   1174.46  (160,15)   1147.60  (182,12)   1147.60  (168,12)   1138.01  (197,18)
111(  1.90,   3.29)   1262.65  (126,14)   1221.62  (259,11)   1221.62  (220, 9)   1219.27  (241,15)   1212.56  (144, 8)
112(  2.44,   2.91)   1282.97  (107,16)   1282.74  ( 61,17)   1272.97  (145,15)   1269.88  (129,22)   1269.53  (108,17)
113(  2.91,   2.44)   1231.30  (142,13)    958.58  (287,10)    867.38  (264,15)    884.58  (207,13)    841.99  (259,12)
114(  3.29,   1.90)   1073.25  (246,11)    926.25  (200,14)    914.89  (174,12)    910.70  (223,11)    897.22  (174,16)
115(  3.57,   1.30)   1328.41  (211, 9)   1254.64  (210,10)    915.13  (201,13)    874.81  (200,11)    865.69  (237,11)
116(  3.74,    .66)   1366.55  (167,15)   1309.08  (130, 7)   1290.72  (216,13)   1203.59  ( 86,14)   1202.15  (236,13)
117(  3.80,    .00)   1311.71  (140,15)   1283.35  (215,10)   1276.48  (175,18)   1266.58  (219,13)   1259.46  (230,16)
118(  3.74,   -.66)   1282.50  (220,17)   1255.13  ( 77,12)   1212.28  (130,12)   1195.48  (140,12)   1177.35  (165,16)
119(  3.57,  -1.30)   1254.37  (162,13)   1237.07  (145,17)   1228.70  (247,14)   1204.34  ( 20,14)   1185.83  (269,10)
120(  3.29,  -1.90)   1300.17  (211,12)   1246.46  (162,16)   1228.69  (247,14)   1186.81  (230,11)   1159.92  ( 91,14)
121(  2.91,  -2.44)   1310.35  (267,12)   1268.24  (208,17)   1220.38  (135,18)   1214.42  (203,15)   1208.89  (231,15)
122(  2.44,  -2.91)   1256.75  ( 64,15)   1229.42  (138,11)   1209.55  ( 94, 7)   1198.49  (148,13)   1198.49  (186,12)
123(  1.90,  -3.29)   1269.88  (172, 2)   1222.85  (278,12)   1221.55  (205,10)   1197.77  (218,11)   1182.41  (291,12)
124(  1.30,  -3.57)   1265.69  (249,14)   1163.71  (284,13)   1158.54  ( 47, 5)   1142.17  (138,14)   1119.55  (208,18)
125(   .66,  -3.74)   1231.09  (278,14)   1206.82  (232,13)   1191.93  (244,15)   1154.73  (207,16)   1119.55  (206,15)
126(   .00,  -3.80)   1427.04  (244,13)   1269.74  (217,11)   1237.76  (221,12)   1224.53  (186,11)   1174.16  (292,18)
127(  -.66,  -3.74)   1259.46  (203,16)   1222.79  (153,11)   1207.72  (217,15)   1179.73  (290,10)   1163.42  (255,11)
128( -1.30,  -3.57)   1082.46  (212,15)   1021.48  (257,17)   1020.74  (217,14)   1005.03  (217,12)   1002.48  (232,10)
129( -1.90,  -3.29)    988.54  (221,10)    979.00  (290,11)    978.09  (115,15)    973.58  (206,17)    965.22  (259,15)
130( -2.44,  -2.91)   1117.16  (115, 8)   1075.33  (141,11)   1040.46  (116,15)   1035.83  (256,15)   1005.72  (242,14)
131( -2.91,  -2.44)    987.33  (201,11)    961.71  (207,15)    881.63  (192,10)    881.41  (187,14)    859.10  (178,10)
132( -3.29,  -1.90)   1193.83  (115,13)   1024.47  (115,11)    988.17  (136,13)    900.23  (192,16)    879.39  (202,11)
133( -3.57,  -1.30)    985.24  (115,13)    955.69  (146,10)    906.88  (178,12)    859.73  ( 82,12)    859.02  (288,13)
134( -3.74,   -.66)   1018.58  (178,16)    825.97  (123,11)    820.17  (279,13)    813.82  (146,14)    797.06  (228,14)
135( -3.80,    .00)   1234.23  (178,16)   1131.30  (243,10)   1000.35  (204,14)    906.34  (122,16)    905.01  (245,11)
136( -3.74,    .66)   1228.88  (219,10)   1111.99  (246,10)   1093.38  (180, 9)   1018.34  ( 79,12)   1000.35  (204,14)
137( -3.57,   1.30)   1114.76  (180,15)   1113.60  (180,14)   1057.71  (213,14)    902.98  (213,16)    901.90  (181,16)
138( -3.29,   1.90)    981.61  (300,12)    956.55  (202,12)    948.09  (213,15)    938.44  (180,15)    893.58  (254,11)
139( -2.91,   2.44)    965.34  (169,10)    939.32  (202,10)    927.09  (173,14)    901.79  (229,14)    895.05  (228,11)
140( -2.44,   2.91)    944.63  (282,11)    936.83  (193,15)    894.48  (180,10)    887.23  (213,13)    835.79  (201,12)
141( -1.90,   3.29)    924.21  (251,15)    910.97  (181,11)    890.42  (226,13)    834.49  (193,12)    819.48  (275,11)
142( -1.30,   3.57)   1046.94  (174,14)    898.44  (142,15)    898.05  (169,16)    877.79  (277,14)    846.56  (214,14)
143(  -.66,   3.74)    915.33  (125,14)    886.81  (198,16)    842.66  (178,14)    809.94  ( 58,13)    789.34  (251,12)
144(   .00,   3.80)   1121.15  ( 29,10)    876.89  (193,11)    875.51  (242,15)    854.60  (258,14)    847.16  (158,11)
145(  1.08,   6.11)    799.14  (298,12)    773.11  (306,10)    735.47  (329,11)    729.74  (164,11)    720.45  (136,15)
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 146(   2.12,   5.83)    832.50  (175, 8)     786.56  (264,10)     749.97  ( 18,13)     729.73  (164,11)     725.53  (251,10)
 147(   3.10,   5.37)    882.80  (251,10)     888.62  (270,10)     832.66  (184, 8)     830.19  (208,11)     767.80  (243,11)
 148(   3.99,   4.75)    872.72  (159,11)     802.95  (314,11)     768.88  (307,12)     738.95  (156,17)     738.43  (281,10)
 149(   4.75,   3.99)    823.88  (199,10)     804.63  (182,13)     766.92  (287,10)     735.43  (210,16)     705.51  (269,16)
 150(   5.37,   3.10)    887.49  (171, 8)     860.28  (246,11)     754.90  (214,17)     753.85  (137, 9)     736.75  (322,12)
 151(   5.83,   2.12)    963.35  (171,12)     955.52  (201,14)     919.63  (223,15)     919.35  (140,16)     910.79  (174,17)
 152(   6.11,   1.08)    973.73  (209,17)     973.73  (209,18)     940.37  (268, 2)     932.88  (184, 9)     930.50  (231, 9)
 153(   6.20,    .00)    972.89  (140,15)     947.05  (184,13)     928.38  (220,15)     915.83  (318,14)     892.06  (326, 6)
 154(   6.11,  -1.08)    970.70  (141, 1)     944.34  (236,15)     938.26  (104,21)     922.53  (248,21)     915.98  (220,17)
 155(   5.83,  -2.12)    962.69  (223,18)     938.69  (200,18)     938.69  (222,18)     903.02  (223,17)     895.26  (264,17)
 156(   5.37,  -3.10)    999.89  (253,17)     962.60  (202,18)     910.87  (334, 8)     897.89  ( 98,20)     897.35  (211,12)
 157(   4.75,  -3.99)    953.79  (221,17)     933.57  (208,17)     924.67  (267,12)     872.51  (365,17)     852.78  (202,20)
 158(   3.99,  -4.75)    977.81  (208, 8)     973.73  (205,13)     928.88  (278, 6)     898.04  (341, 3)     875.67  (280,13)
 159(   3.10,  -5.37)    978.29  (205,10)     955.52  (219,18)     949.37  (308,15)     928.89  (172, 2)     913.95  (278,12)
 160(   2.12,  -5.83)    956.75  (290,20)     899.45  (249,16)     882.23  (162,20)     877.01  (249, 1)     868.22  (135, 5)
 161(   1.08,  -6.11)    958.76  (217,20)     956.35  (249, 3)     886.00  (135, 1)     871.45  (168, 2)     865.48  (211,17)
 162(    .00,  -6.20)   1035.69  (284,13)     976.67  (211,20)     947.03  (285, 2)     904.05  (113,22)     918.36  (207,22)
 163(  -1.08,  -6.11)    866.45  (217,15)     849.66  (279, 9)     846.06  (255,11)     827.43  (290,10)     815.33  (284,12)
 164(  -2.12,  -5.83)    983.87  (218,16)     956.35  (162,24)     914.26  (217,22)     898.67  ( 78, 5)     887.74  (256,16)
 165(  -3.10,  -5.37)    932.97  (141, 7)     928.21  (257, 3)     881.31  (255,22)     871.10  (218,18)     850.78  (256,12)
 166(  -3.99,  -4.75)    820.18  (115, 8)     814.76  (141,11)     755.69  (245,18)     716.67  (199,17)     713.18  (177,17)
 167(  -4.75,  -3.99)    698.31  (177,16)     690.35  (122,18)     647.41  (257,16)     647.01  (201,11)     639.61  (151, 9)
 168(  -5.37,  -3.10)    923.20  (208,10)     777.41  (115,17)     777.30  (313,15)     740.62  (115,11)     736.11  (205,17)
 169(  -5.83,  -2.12)    870.33  (146,10)     828.45  (217,16)     788.36  (288,10)     775.41  (304,11)     771.00  (153,14)
 170(  -6.11,  -1.08)    939.60  (288,21)     883.77  (219, 1)     877.11  (222,23)     874.25  (239,23)     871.87  (207,21)
 171(  -6.20,    .00)    992.73  (243,10)     803.72  (178,16)     712.86  (289,15)     699.65  (207, 9)     680.58  (288,12)
 172(  -6.11,   1.08)    956.68  (219,10)     789.83  (246,10)     764.46  (180, 9)     751.13  ( 79,12)     679.83  ( 79,11)
 173(  -5.83,   2.12)    846.78  ( 11,12)     807.00  (128, 8)     786.49  (228, 8)     755.81  (180,14)     755.81  (180,15)
 174(  -5.37,   3.10)    960.56  (193,10)     898.79  (300,12)     797.67  (319,11)     781.09  (243, 9)     761.53  (275,13)
 175(  -4.75,   3.99)    777.01  (188, 9)     769.65  (132, 9)     769.11  (202,10)     732.40  (240, 9)     729.25  (183,17)
 176(  -3.99,   4.75)    914.30  (319,15)     894.96  (169,22)     884.88  (251, 1)     869.67  (228, 9)     866.23  (356,15)
 177(  -3.10,   5.37)    887.99  (214,11)     845.89  (309,13)     843.90  (170,18)     809.90  (213,17)     805.32  (214, 9)
 178(  -2.12,   5.83)    870.70  (125,17)     810.28  (265,15)     800.35  (312,13)     796.61  (332,12)     787.62  (136,16)
 179(  -1.08,   6.11)    851.60  (240,17)     801.16  (265,14)     764.21  (251,12)     756.00  (329,12)     749.10  (309,15)
 180(    .00,   6.20)    841.69  ( 29,10)     795.81  ( 45,16)     783.43  (143,19)     725.11  (306,16)     708.55  (247,17)

                             FIVE HIGHEST  3-HOUR SO2  CONCENTRATIONS(ENDING ON JULIAN DAY, HOUR)
                                                (MICROGRAMS/M**3)

RECEPTOR                          1                    2                    3                    4                    5

   1(    .16,    .89)    988.19  (209,15)     787.78  (139,12)     629.74  (164,12)     537.63  (199,15)     501.04  (199,12)
   2(    .31,    .85)    948.49  (139,12)     650.08  (164,12)     561.78  (207,12)     315.23  (209,15)     181.57  (199,15)
   3(    .45,    .78)    631.37  (139,12)     589.07  (207,12)     265.43  (164,12)     179.00  (165,15)      81.84  (197,12)
   4(    .58,    .69)    514.59  (185,15)     276.37  (207,12)     246.36  (142,15)     210.69  (139,12)      66.54  (160,15)
   5(    .69,    .58)    691.01  (185,15)     316.99  (142,15)     258.80  (198,12)     187.56  (174,12)      99.08  (178,15)
   6(    .78,    .45)    586.87  (198,12)     436.85  (185,15)     331.17  (174,12)     171.29  (142,15)      88.08  (178,15)
   7(    .85,    .31)    624.96  (198,12)     250.15  (178,12)     117.23  (185,15)     115.46  (247,12)     106.82  (219,15)
   8(    .89,    .16)    317.26  (198,12)     294.88  (136,12)     282.64  (219,15)      77.95  (178,12)      65.27  (210,15)
   9(    .90,    .00)    577.23  (136,12)     301.13  (219,15)      62.00  (198,12)      37.02  (210,15)      29.95  (205,12)
  10(    .89,   -.16)    543.75  (136,12)     216.18  (205,12)     142.64  (219,15)      37.97  (223,15)      30.07  (247,15)
  11(    .85,   -.31)    553.03  (205,12)     332.02  (136,12)      86.59  (247,15)      75.94  (185,12)      62.62  (185,15)
  12(    .78,   -.45)    641.87  (205,12)     435.94  (136,12)     324.08  (185,12)     316.37  (185,15)     268.52  (187,12)
  13(    .69,   -.58)    684.18  (203,12)     682.10  (136,12)     677.48  (185,15)     643.00  (187,12)     603.18  (185,12)
  14(    .58,   -.69)   1262.34  (203,12)     738.03  (187,12)     697.95  (185,15)     673.54  (142,12)     554.84  (136,12)
  15(    .45,   -.78)   1231.91  (203,12)     780.45  (150,12)     744.22  (142,12)     441.58  (142,15)     389.07  (187,12)
  16(    .31,   -.85)    604.83  (203,12)     588.70  (150,12)     354.55  (142,12)     347.03  (142,15)     273.96  (135,15)
 17(  .16,  -.89)   323.33 (150,12)    296.28 (208,15)    131.96 (203,12)   120.12 (179,15)   111.08 (179,12)
 18(  .00,  -.90)   557.55 (208,15)    127.17 (150,12)     48.71 (179,12)    38.49 (163,15)    35.20 (204,12)
 19( -.16,  -.89)   519.11 (208,15)    222.30 (163,15)     32.01 (204,12)    30.82 (168,15)    23.39 (150,12)
 20( -.31,  -.85)   489.48 (163,15)    226.89 (208,15)    172.15 (204,12)    48.95 (146,15)    40.09 (177,15)
 21( -.45,  -.78)   486.48 (163,15)    454.83 (204,12)    365.77 (146,15)   212.56 (228,15)   158.25 (207,15)
 22( -.58,  -.69)   620.61 (146,15)    530.55 (204,12)    488.80 (207,15)   474.78 (228,15)   368.64 (201,12)
 23( -.69,  -.58)   660.58 (207,15)    589.17 (222,15)    543.80 (201,12)   496.58 (146,15)   474.79 (228,15)
 24( -.78,  -.45)   605.90 (143,15)    550.37 (222,15)    539.76 (202,12)   528.38 (178,15)   511.58 (115,15)
 25( -.85,  -.31)   623.40 (177,12)    605.90 (143,15)    435.56 (115,15)   395.97 (202,12)   353.96 (179,12)
 26( -.89,  -.16)   655.58 (179,12)    647.11 (204,15)    500.69 (206,15)   472.37 (177,12)   324.97 (227,12)
 27( -.90,   .00)   716.01 (204,15)    604.21 (227,12)    572.56 (179,12)   548.16 (206,15)   183.90 (177,12)
 28( -.89,   .16)   533.87 (227,12)    396.08 (204,15)    289.75 (213,15)   276.52 (206,15)   231.53 (179,12)
 29( -.85,   .31)   330.48 (213,15)    217.91 (227,12)     97.58 (180,12)    94.42 (204,15)    91.12 (193,15)
 30( -.78,   .45)   181.87 (213,15)    161.63 (125,12)    146.18 (201,12)   145.28 (180,12)   118.16 (164,15)
 31( -.69,   .58)   604.60 (201,12)    597.49 (125,12)    527.81 (164,15)   381.87 (169,12)   304.19 (214,15)
 32( -.58,   .69)   448.60 (201,12)    433.36 (164,15)    314.71 (125,12)   717.56 (214,15)   229.17 (213,12)
 33( -.45,   .78)   812.07 (214,15)    639.97 (164,15)    550.08 (201,12)   539.69 (125,12)   288.34 (174,15)
 34( -.31,   .85)   443.12 (214,15)    408.29 (178,15)    379.78 (209,15)   301.44 (178,15)   224.49 (164,15)
 35( -.16,   .89)  1079.42 (209,15)    512.95 (199,12)    474.17 (199,15)   449.19 (193,12)   368.29 (178,15)
 36(  .00,   .90) * 1446.44 (209,15)    723.20 (199,12)    720.50 (199,15) . 593.37 (193,12)   312.34 (139,12)
 37(  .26,  1.48)  1104.56 (164,12)    777.93 (139,12)    691.01 (209,15)   411.21 (193,12)   356.83 (199,12)
 38(  .51,  1.41)  1185.07 (164,12)  1 095.46 (139,12)    565.81 (207,12)   391.06 (126,12)   374.01 (209,15)
 39(  .75,  1.30)   880.26 (139,12)    742.92 (207,12)    637.97 (197,15)   534.86 (125,12)   499.30 (164,12)
 40(  .96,  1.15)  1067.52 (137,15)  1 045.65 (145,15)   1005.45 (161,12)   956.40 (197,15)   837.69 ( 61,18)
 41( 1.15,   .96)  1194.03 ( 65, 6)    883.92 (142,15)    647.76 ( 84,12)   645.43 (145,15)   617.32 (260,15)
 42( 1.30,   .75)   764.13 (174,12)    661.16 (247,12)    587.47 (143,12)   521.56 (210,12)   517.28 (198,12)
 43( 1.41,   .51)   824.75 (247,12)    589.18 (198,12)    550.46 (139,15)   492.55 (174,12)   411.26 (143,12)
 44( 1.48,   .26)   859.77 (219,15)    463.40 (247,12)    375.59 (198,12)   322.83 (136,12)   306.57 (156,12)
 45( 1.50,   .00)   946.23 (219,15)    649.23 (136,12)    250.07 (156,15)   243.05 (156,12)   195.92 (222,15)
 46( 1.48,  -.26)   613.06 (136,12)    574.40 (219,15)    329.25 (247,15)   230.20 (205,12)   212.29 (156,15)
 47( 1.41,  -.51)   844.26 (247,15)    596.96 (205,12)    573.71 (162,15)   442.93 (155,12)   422.66 (223,15)
 48( 1.30,  -.75)   815.54 (247,15)    739.96 (162,12)    721.45 (185,12)   694.57 (205,12)   638.53 (155,15)
 49( 1.15,  -.96)   924.76 (187,12)    814.93 (136,12)    790.87 (185,12)   784.63 (203,15)   700.30 (203,12)
 50(  .96, -1.15)  1125.55 (203,12) * 1 112.94 (187,12)    817.35 (203,15)   697.96 ( 91,18)   677.42 (198,15)
 51(  .75, -1.30)   940.67 (203,12)    766.95 (142,15)    643.83 (150,12)   567.31 (142,12)   316.25 (227,15)
 52(  .51, -1.41)   605.85 (142,15)    506.25 (150,12)    408.76 (203,12)   268.66 (291,12)   265.46 (179,15)
 53(  .26, -1.48)   798.97 (150,12)    734.67 (179,12)    557.54 (204,15)   535.53 (179,15)   529.50 (204,12)
 54(  .00, -1.50)   866.92 (208,15)    603.09 (204,12)    556.01 (150,12)   443.75 (179,12)   354.94 (221,12)
 55( -.26, -1.48)   596.21 (208,15)    331.10 (163,15)    292.80 (168,15)   195.25 (204,12)   190.30 (150,15)
 56( -.51, -1.41)   908.77 (163,15)    491.75 (141,15)    369.66 (151,15)   349.19 (177,15)   298.47 (222,12)
 57( -.75, -1.30)   959.57 (222,12)    951.27 (163,15)    894.57 (115,15)   858.25 (177,15)   538.34 (221,12)
 58( -.96, -1.15)   817.46 (207,15)    803.76 (222,12)    730.21 (116,15)   666.57 (115,15)   562.87 (204,12)
 59(-1.15,  -.96)  1176.07 (207,15)    728.77 (201,12)    540.41 (115,15)   536.84 (136,15)   531.74 (222,15)
 60(-1.30,  -.75)   901.86 (115,15)    869.97 (207,15)    728.70 (136,15)   650.73 (202,12)   547.35 (178,15)
 61(-1.41,  -.51)   773.81 (115,15)    669.89 (177,12)    480.24 (202,12)   459.34 (136,15)   426.38 (143,15)
 62(-1.48,  -.26)   696.41 (204,15)    640.56 (178,18)    566.11 (206,15)   486.64 (177,12)   450.73 (179,12)
 63(-1.50,   .00)  1040.97 (204,15)    761.13 (178,18)    616.79 (206,15)   471.00 (227,12)   390.73 (179,12)
 64(-1.48,   .26)   818.80 (204,15)    694.38 (213,15)    406.85 (227,12)   380.23 (178,18)   291.48 (124,15)
 65(-1.41,   .51)   775.81 (213,15)    437.52 (180,15)    320.79 (180,12)   310.07 (204,15)   286.73 (193,15)
 66(-1.30,   .75)   432.35 (213,15)    285.01 (229,15)    277.65 (180,12)   234.61 (180,15)   186.65 (201,12)
 67(-1.15,   .96)   657.55 (201,12)    444.86 (169,12)    386.15 (173,15)   333.33 (229,15)   332.38 (164,15)
 68( -.96,  1.15)   989.27 (201,12)    566.93 (164,15)    477.06 (125,12)   422.71 (214,15)   357.78 (188,12)
 69( -.75,  1.30)   696.86 (201,12)    596.58 (214,15)    498.47 (174,15)   452.63 (164,15)   393.60 (181,12)
 70( -.51,  1.41)   733.88 (174,15)    518.66 (178,15)    425.07 (214,15)   408.06 (125,15)   230.91 (209,15)
 71( -.26,  1.48)   673.38 (209,15)    638.01 (178,15)    497.70 (174,15)   480.87 (193,12)   387.01 (125,15)
 72(  .00,  1.50)   926.02 (209,15)    648.83 (193,12)    496.71 (199,12)   461.55 (199,15)   437.08 (164,12)
 73(  .35,  1.97)   944.80 (164,12)    696.77 (139,12)    493.64 (209,15)   406.21 (172,12)   401.27 (126,12)
 74(   .68,  1.88)   1054.00 (164,12)    921.27 (139,12)    583.46 (126,12)    538.78 (125,12)    513.25 (172,12)
 75(  1.00,  1.73)    822.60 (197,15)    698.88 (207,12)    686.81 (125,12)    672.79 (126,15)    659.60 (139,12)
 76(  1.29,  1.53)    815.90 (197,15)    808.63 (137,15)    663.68 (265,12)    624.38 (161,12)    564.45 (142,15)
 77(  1.53,  1.29)    922.38 ( 65, 6)    797.28 (260,15)    719.85 (142,15)    692.18 ( 84,12)    600.33 (197,18)
 78(  1.73,  1.00)    840.77 (210,12)    782.68 (178,12)    760.08 (143,12)    720.93 (247,12)    696.95 (200,15)
 79(  1.88,   .68)    919.22 (247,12)    670.47 (139,15)    558.87 (143,12)    507.89 (198,12)    500.98 (156,15)
 80(  1.97,   .35)    689.68 (219,15)    453.41 (156,12)    444.22 (247,12)    425.41 (198,12)    391.84 (269,12)
 81(  2.00,   .00)    777.65 (219,15)    504.92 (136,12)    431.51 (156,12)    372.20 (222,15)    348.68 (156,15)
 82(  1.97,  -.35)    628.43 (219,15)    597.41 (166,15)    526.46 (176,12)    472.13 (136,12)    425.28 (131,15)
 83(  1.88,  -.68)   1260.82 ( 20,15)   1109.48 (162,15)   1030.96 (247,15)    676.48 (162,12)    665.28 ( 77,18)
 84(  1.73, -1.00)    868.60 (247,15)    864.72 (162,12)    778.17 (155,15)    739.83 (293,12)    723.41 (254,15)
 85(  1.53, -1.29)    979.51 (187,12)    862.49 (203,15)    724.87 (155,12)    701.60 (185,12)    633.54 (136,12)
 86(  1.29, -1.53)   1098.21 (187,12)    869.41 (203,12)    788.28 (203,15)    762.37 ( 91,18)    687.13 ( 94, 9)
 87(  1.00, -1.73)    717.97 (203,12)    636.60 (142,15)    506.46 (150,12)    439.31 (142,12)    397.37 (106,15)
 88(   .68, -1.88)    499.13 (142,15)    453.79 (150,12)    417.48 (279,12)    397.51 (291,12)    352.93 (252,12)
 89(   .35, -1.97)    625.11 (150,12)    602.15 (179,12)    414.58 (204,12)    392.28 (179,15)    361.14 (244,15)
 90(   .00, -2.00)    740.92 (208,15)    636.68 (204,12)    513.86 (150,12)    426.05 (179,12)    341.73 (244,15)
 91(  -.35, -1.97)    607.04 (168,15)    561.42 (208,15)    490.11 (218,15)    448.87 (243,15)    406.30 (203,18)
 92(  -.68, -1.88)    894.15 (163,15)    833.19 (141,15)    588.40 (141,12)    499.55 (212,15)    492.10 (168,15)
 93( -1.00, -1.73)   1025.81 (222,12)    928.85 (177,15)    927.64 (115,15)    825.19 (163,15)    644.67 (290,12)
 94( -1.29, -1.53)    995.63 (116,15)    980.76 (222,12)    629.99 (115,15)    629.15 (115,12)    627.85 (245,15)
 95( -1.53, -1.29)    853.87 (207,15)    639.26 (192,15)    575.51 (201,12)    567.26 (115,12)    482.84 (219,12)
 96( -1.73, -1.00)    702.43 (115,15)    643.46 (207,15)    576.43 (136,15)    538.96 (219,12)    512.98 (202,12)
 97( -1.88,  -.68)    653.43 (177,12)    595.92 (115,15)    579.15 (146,12)    504.48 (246,15)    427.12 ( 82,12)
 98( -1.97,  -.35)    725.45 (178,18)    609.56 (146,15)    530.01 (146,12)    513.30 (204,15)    477.14 (206,15)
 99( -2.00,   .00)    879.02 (178,18)    846.92 (204,15)    530.33 (206,15)    352.95 (177,12)    343.06 (227,12)
100( -1.97,   .35)    699.38 (204,15)    580.95 (213,15)    458.38 (124,18)    445.82 (124,15)    417.20 (178,18)
101( -1.88,   .68)    697.88 (213,15)    631.41 (180,15)    412.95 (180,12)    333.81 (124,12)    331.01 (193,15)
102( -1.73,  1.00)    476.64 (213,15)    435.68 (229,15)    388.27 (190,12)    348.53 (180,15)    325.84 (202,12)
103( -1.53,  1.29)    638.16 (169,12)    598.70 (173,15)    546.88 (275,12)    537.12 (229,15)    499.31 (201,12)
104( -1.29,  1.53)    773.40 (201,12)    575.53 (188,12)    529.57 (250,15)    527.88 (275,12)    459.83 (181,12)
105( -1.00,  1.73)    660.00 (181,12)    536.16 (214,15)    530.92 (201,12)    506.70 (169,15)    405.72 (174,15)
106(  -.68,  1.88)    638.28 (125,15)    609.98 (174,15)    453.25 (214,15)    386.54 (178,15)    291.24 (169,18)
107(  -.35,  1.97)    656.84 (125,15)    492.90 (178,15)    428.57 (158,12)    416.64 (209,15)    405.86 (174,15)
108(   .00,  2.00)    603.64 (209,15)    511.53 (193,12)    475.36 (158,12)    363.58 (199,12)    339.33 (164,12)
109(   .66,  3.74)    579.53 (164,12)    554.18 (139,12)    501.76 (136,15)    497.26 (188,15)    495.77 ( 73,15)
110(  1.30,  3.57)    635.84 (168,12)    612.97 (139,12)    598.13 (183,12)    574.71 (172,12)    547.00 (125, 9)
111(  1.90,  3.29)    985.74 (282,12)    828.83 (317,18)    827.92 (270,12)    792.54 (129,12)    765.76 (359,12)
112(  2.44,  2.91)    988.57 (137,15)    867.56 (316,15)    850.45 (129,24)    796.53 (  3, 3)    795.59 ( 56,12)
113(  2.91,  2.44)    516.07 (260,15)    413.96 ( 84,12)    410.47 (142,15)    391.50 (223,12)    391.40 (264,15)
114(  3.29,  1.90)    704.17 (210,12)    652.11 (223,12)    538.17 (174,12)    522.95 (200,15)    512.30 ( 78,15)
115(  3.57,  1.30)    578.20 (247,12)    577.16 (143,12)    551.34 (258,15)    535.32 (210,12)    531.68 (130,15)
116(  3.74,   .66)    769.37 ( 86, 6)    756.12 (113,15)    750.44 (236,15)    725.67 (216,15)    689.52 (209,18)
117(  3.80,   .00)    934.28 (113,18)    859.00 ( 10, 3)    844.28 ( 25, 3)    807.93 ( 86,21)    725.20 (105,15)
118(  3.74,  -.66)    999.98 (164,15)    696.55 (131,18)    656.78 ( 77,15)    615.20 ( 81,12)    604.76 ( 87, 3)
119(  3.57, -1.30)   1018.43 ( 20,15)    828.93 ( 77,18)    781.58 (247,15)    773.28 (222,18)    768.51 (162,15)
120(  3.29, -1.90)    947.36 ( 98,21)    937.21 ( 70, 9)    775.63 (283,15)    762.13 ( 98,24)    731.77 (162,12)
121(  2.91, -2.44)   1071.07 (221,18)    843.92 (353, 3)    829.73 ( 81,18)    821.83 ( 90,12)    809.77 (203,15)
122(  2.44, -2.91)    748.16 (291,15)    729.44 (187,12)    721.27 (280,15)    692.72 ( 94, 9)    605.19 ( 59,21)
123(  1.90, -3.29)    773.02 (106,15)    753.96 (219,18)    676.06 (278,15)    651.99 (218,12)    620.10 (308,15)
124(  1.30, -3.57)    659.48 (292,18)    642.79 (249,15)    630.67 (279,12)    547.08 (352,12)    584.17 (186, 9)
125(   .66, -3.74)    654.03 (205,15)    612.53 ( 13,15)    569.86 (179,12)    562.95 (244,15)    562.42 (150,12)
126(   .00, -3.80)    554.27 (208,15)    544.15 (204,12)    525.61 (211,21)    507.51 (150, 9)    504.12 (244,15)
127(  -.66, -3.74)    646.70 (290,15)    616.29 (153,12)    509.72 (217,15)    461.88 (255,18)    453.67 (168,15)
128( -1.30, -3.57)    548.26 (227,18)    546.99 (141,15)    541.50 (163,15)    495.03 (141,12)    446.88 ([illegible], 5)
129( -1.90, -3.29)    614.55 (222,12)    549.40 (177,15)    523.92 (115,15)    509.29 (153,18)    462.53 (163, 5)
130( -2.44, -2.91)    669.97 (116,15)    603.36 (222,12)    561.24 (245,15)    407.80 (256,15)    381.13 (115,12)
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 131(  -2.91,  -2.44)    528.26  (115,12)    499.91  (192,15)    476.90  (207,15)    462.55  (192,12)    435.47  (177,18)
 132(  -3.29,  -1.90)    592.62  (192,18)    495.52  (219, 9)    485.67  (289,12)    474.34  (219,12)    457.94  (115,12)
 133(  -3.57,  -1.30)    648.53  (146,12)    530.10  (177,12)    508.52  (246,15)    504.01  (228,18)    503.92  ( 82,12)
 134(  -3.74,   -.66)    560.84  (178,18)    532.75  (146,15)    525.84  (146,12)    396.63  (228,15)    390.34  (206,15)
 135(  -3.80,    .00)    812.99  (178,18)    478.87  (208,15)    467.70  (299,15)    455.54  (123,12)    450.41  (229,12)
 136(  -3.74,    .66)    576.90  ( 79,12)    542.55  (124,18)    519.54  (124,15)    513.58  (206,12)    466.46  (229,12)
 137(  -3.57,   1.30)    742.79  (180,15)    513.80  (124, 9)    499.29  (181,18)    404.10  (251,18)    491.47  (213,18)
 138(  -3.29,   1.90)    505.01  (181,15)    474.13  (202,12)    472.18  (213,15)    465.19  (181,18)    428.42  (180,12)
 139(  -2.91,   2.44)    592.61  (169,12)    578.97  (275,12)    511.15  (229,15)    471.28  (173,15)    454.90  (122,12)
 140(  -2.44,   2.91)    546.65  (188,12)    519.32  (275,12)    480.27  (250,15)    462.74  (181,12)    451.43  (193,15)
 141(  -1.90,   3.29)    785.62  (181,12)    606.51  (332,15)    466.53  (169,15)    385.62  (218,15)    356.27  (188,12)
 142(  -1.30,   3.57)    596.72  (125,15)    489.43  (136,18)    366.99  (214,15)    348.98  (174,15)    300.54  (169,18)
 143(   -.66,   3.74)    722.91  (125,15)    514.75  (158,12)    443.99  ( 43,15)    345.59  (265,15)    296.48  (198,18)
 144(    .00,   3.80)    512.26  (158,12)    380.31  (136,15)    373.91  ( 29,12)    357.66  (119, 9)    343.08  (209,15)
 145(   1.08,   6.11)    436.91  (188,15)    412.99  ( 73,15)    384.72  (136,15)    346.39  (164,12)    338.55  (139,12)
 146(   2.12,   5.83)    382.14  (125, 9)    368.39  (164,12)    366.67  (139,12)    343.34  (183,12)    338.79  (299,12)
 147(   3.10,   5.37)    486.13  (251,12)    429.17  (264,12)    408.01  (270,12)    399.62  ( 14,12)    366.66  (126,15)
 148(   3.99,   4.75)    510.39  ( 56,12)    490.94  (264,12)    466.87  (137,15)    440.61  (159,12)    416.27  (329,15)
 149(   4.75,   3.99)    439.39  (260,15)    437.82  (328,15)    372.52  (264,15)    343.42  (302,12)    329.06  (314,15)
 150(   5.37,   3.10)    475.80  (210,12)    438.18  (223,12)    340.77  (160,18)    335.88  ( 78,15)    335.55  (220,12)
 151(   5.83,   2.12)    706.12  (174,18)    653.62  ( 25,18)    647.87  (165,12)    645.22  (130,15)    595.43  (105,12)
 152(   6.11,   1.08)    649.15  (209,18)    573.18  ( 86, 6)    563.73  ( 39, 3)    552.88  ( 38,15)    542.95  ( 88,12)
 153(   6.20,    .00)    819.61  (113,18)    711.88  ( 10, 3)    604.23  ( 86,21)    553.88  ( 25, 3)    549.28  (105,15)
 154(   6.11,  -1.08)    677.77  (166,15)    632.21  (131,18)    536.76  ( 87, 3)    520.85  (293, 3)    516.70  ( 81,12)
 155(   5.83,  -2.12)    674.72  ( 20,15)    663.10  (222,18)    624.37  ( 77,18)    621.88  (223,18)    589.06  (187,18)
 156(   5.37,  -3.10)    783.22  ( 98,21)    731.61  (283,1 )    681.10  ( 98,24)    657.96  ( 70, 9)    545.95  ( 70,12)
 157(   4.75,  -3.99)    770.08  (221,18)    659.02  (353, .     644.50  ( 81,18)    625.49  ( 90,12)    509.74  (267,12)
 158(   3.99,  -4.75)    614.17  (381, 3)    535.28  ( 59,21,    520.95  ( 94, 9)    519.99  (224,24)    518.97  (280,15)
 159(   3.10,  -5.37)    618.17  (219,18)    575.47  (361,15)    565.92  (308,15)    515.86  (278,15)    505.62  (148,18)
 160(   2.12,  -5.83)    514.68  (352,12)    495.86  (292,18)    475.27  (355, 3)    456.51  (340,18)    450.51  (186, 9)
 161(   1.08,  -6.11)    549.63  (249, 3)    533.84  (340,21)    470.70  (354,21)    449.56  (205,15)    448.19  ( 13,15)
 162(    .00,  -6.20)    762.10  (211,21)    488.96  (361,21)    373.78  (195, 3)    360.34  ( 42, 3)    358.68  (244,15)
 163(  -1.08,  -6.11)    531.83  (168, 6)    497.80  (290,15)    479.28  (153,12)    420.62  (150, 3)    388.20  (255,18)
 164(  -2.12,  -5.83)    513.19  ( 13,12)    503.57  (227,18)    495.95  (256,18)    486.97  (255,21)    484.21  (304,15)
 165(  -3.10,  -5.37)    492.09  (255,24)    463.86  (153,18)    458.71  (163, 3)    375.46  (290,12)    366.97  (177,15)
 166(  -3.99,  -4.75)    431.26  (116,15)    418.13  (285,15)    356.04  (222,12)    274.36  (115, 9)    273.36  (177,18)
 167(  -4.75,  -3.99)    419.24  (177,18)    370.54  (115,12)    335.01  (116,12)    310.91  (207,15)    300.01  (192,12)
 168(  -5.37,  -3.10)    620.98  (192,18)    469.42  (205,18)    408.05  (289,12)    397.00  (212, 9)    390.36  (219, 9)
 169(  -5.83,  -2.12)    462.29  ( 79,15)    461.13  (144,12)    423.60  (274,15)    414.37  ( 12,12)    413.31  (228,18)
 170(  -6.11,  -1.08)    598.83  ( 79,21)    585.80  ( 36,21)    482.87  (157,24)    470.47  ( 64,18)    443.00  (  8,18)
 171(  -6.20,    .00)    648.80  (178,18)    430.86  (289,15)    393.32  (229,12)    382.57  (123,12)    330.91  (243,12)
 172(  -6.11,   1.08)    504.85  ( 79,12)    368.29  (229,12)    350.72  (124,18)    345.24  (124,15)    337.74  (129,12)
 173(  -5.83,   2.12)    503.87  (180,15)    494.21  (124, 9)    483.39  (251,18)    402.80  (181,18)    386.19  (213,18)
 174(  -5.37,   3.10)    407.17  (181,18)    381.77  (181,15)    320.25  (193,12)    317.64  (157,15)    307.68  (213,15)
 175(  -4.75,   3.99)    403.58  (122,12)    402.68  (169,12)    381.52  (275,12)    350.26  (102,18)    337.10  (122, 9)
 176(  -3.99,   4.75)    532.01  (350,24)    516.78  ( 30,24)    514.45  (118,12)    509.15  ( 73,12)    484.38  (103,18)
 177(  -3.10,   5.37)    620.26  (332,15)    571.16  (181,12)    488.95  (214,12)    426.08  (309,15)    406.57  (136,18)
 178(  -2.12,   5.83)    520.38  (136,18)    427.70  ( 19,15)    327.58  (125,15)    325.91  (103,12)    321.36  (309,15)
 179(  -1.08,   6.11)    453.07  ( 43,15)    432.15  (125,15)    391.57  (255,15)    367.69  (158,12)    293.89  ( 66,12)
 180(    .00,   6.20)    344.51  (119, 9)    290.61  (265,15)    289.97  (158,12)    282.73  (136,15)    281.04  ( 29,12)

                         FIVE HIGHEST 8-HOUR SO2 CONCENTRATIONS(ENDING @ JULIAN DAY, HOUR)
                                               (MICROGRAMS/M**3)

RECEPTOR                       1                   2                   3                   4                   5

   1(    .16,    .89)    389.86  (199,16)    369.59  (209,16)    284.85  (139,16)    236.23  (164,16)    140.19  (193,16)
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  2(   .31,   .85)   361.39 (139,16)   245.13 (164,16)   210.67 (207,16)   130.50 (199,16)   124.37 (209,16)
  3(   .45,   .78)   238.93 (139,16)   220.99 (207,16)    99.76 (164,16)    67.13 (185,16)    54.72 (197,16)
  4(   .58,   .69)   192.97 (185,16)   104.96 (207,16)    92.39 (142,16)    85.26 (139,16)    36.27 (160,16)
  5(   .69,   .58)   259.13 (185,16)   118.87 (142,16)   107.89 (174,16)    97.64 (198,16)    49.92 (160,16)
  6(   .78,   .45)   223.17 (198,16)   163.83 (185,16)   158.54 (174,16)    64.23 (142,16)    29.03 (247,16)
  7(   .85,   .31)   237.63 (198,16)   105.08 (174,16)    44.15 (185,16)    43.30 (247,16)    40.06 (219,16)
  8(   .89,   .16)   119.74 (198,16)   110.58 (136,16)   105.99 (219,16)    30.17 (174,16)    27.49 (160,16)
  9(   .90,   .00)   216.86 (136,16)   112.92 (219,16)    23.27 (198,16)    17.29 (156,16)    14.01 (210,16)
 10(   .89,  -.16)   203.90 (136,16)    81.05 (205,16)    53.49 (219,16)    14.24 (223,16)    11.70 (247,16)
 11(   .85,  -.31)   207.39 (205,16)   124.51 (136,16)    51.96 (185,16)    32.47 (247,16)    19.13 (155,16)
 12(   .78,  -.45)   240.53 (205,16)   240.15 (185,16)   163.48 (136,16)   102.42 (187,16)    89.37 (203,16)
 13(   .69,  -.58)   480.24 (185,16)   315.72 (203,16)   255.79 (136,16)   246.44 (187,16)   142.37 (205,16)
 14(   .58,  -.69)   548.86 (203,16)   461.89 (185,16)   333.55 (142,16)   281.04 (187,16)   208.08 (136,16)
 15(   .45,  -.78)   489.43 (203,16)   444.68 (142,16)   293.68 (150,16)   207.81 (185,16)   146.53 (187,16)
 16(   .31,  -.85)   263.09 (142,16)   237.73 (150,16)   228.00 (203,16)   150.51 (135,16)   102.43 (179,16)
 17(   .16,  -.89)   141.82 (150,16)   111.38 (208,16)    86.70 (179,16)    57.24 (142,16)    49.50 (203,16)
 18(   .00,  -.90)   209.08 (208,16)    59.33 (150,16)    24.81 (179,16)    14.43 (163,16)    13.24 (204,16)
 19(  -.16,  -.89)   194.67 (208,16)    83.37 (163,16)    14.72 (150,16)    12.02 (204,16)    11.75 (168,16)
 20(  -.31,  -.85)   184.00 (163,16)    85.08 (208,16)    64.58 (204,16)    33.35 (146,16)    15.03 (177,16)
 21(  -.45,  -.78)   187.59 (163,16)   170.56 (204,16)   137.17 (186,16)    79.74 (228,16)    59.34 (207,16)
 22(  -.58,  -.69)   232.73 (146,16)   192.96 (204,16)   183.30 (207,16)   179.10 (228,16)   139.24 (201,16)
 23(  -.69,  -.58)   247.72 (207,16)   221.66 (222,16)   203.93 (201,16)   186.75 (146,16)   183.21 (228,16)
 24(  -.78,  -.45)   227.21 (143,16)   206.51 (222,16)   205.36 (202,16)   201.86 (115,16)   200.62 (178,16)
 25(  -.85,  -.31)   235.75 (177,16)   227.21 (143,16)   166.53 (115,16)   151.43 (202,16)   132.73 (179,16)
 26(  -.89,  -.16)   245.84 (179,16)   242.67 (204,16)   190.31 (206,16)   177.44 (177,16)   121.86 (227,16)
 27(  -.90,   .00)   268.50 (204,16)   226.60 (227,16)   214.71 (179,16)   210.10 (206,16)    68.97 (177,16)
 28(  -.89,   .16)   200.87 (227,16)   148.53 (204,16)   109.56 (206,16)   108.97 (213,16)    86.82 (179,16)
 29(  -.85,   .31)   125.12 (213,16)    85.56 (227,16)    64.01 (180,16)    35.41 (204,16)    34.42 (193,16)
 30(  -.78,   .45)    85.53 (180,16)    72.39 (213,16)    60.61 (125,16)    54.82 (201,16)    44.31 (164,16)
 31(  -.69,   .58)   226.77 (201,16)   224.06 (125,16)   197.99 (164,16)   175.11 (169,16)   114.08 (214,16)
 32(  -.58,   .69)   318.27 (201,16)   312.55 (164,16)   306.57 (125,16)   269.15 (214,16)   130.30 (213,16)
 33(  -.45,   .78)   308.59 (214,16)   239.99 (164,16)   217.24 (125,16)   206.29 (201,16)   108.13 (174,16)
 34(  -.31,   .85)   166.18 (218,16)   153.11 (174,16)   142.42 (209,16)   113.12 (178,16)   112.36 (199,16)
 35(  -.16,   .89)   404.78 (209,16)   370.15 (199,16)   168.45 (193,16)   138.14 (178,16)    96.87 (174,16)
 36(   .00,   .90)   542.42 (209,16)   541.42 (199,16)   222.51 (193,16)   117.89 (139,16)   100.01 (164,16)
 37(   .26,  1.48)   419.30 (164,16)   384.99 (139,16)   265.72 (199,16)   265.29 (209,16)   154.20 (193,16)
 38(   .51,  1.41)   485.23 (164,16)   484.88 (139,16)   221.74 (209,16)   212.18 (207,16)   196.13 (197,16)
 39(   .75,  1.30)   441.85 (197,16)   365.77 (139,16)   297.84 (209,16)   280.32 (207,16)   264.10 (126,16)
 40(   .96,  1.15)   699.27 (197,16)   495.75 (317,16)   476.41 (145,16)   433.56 (161,16)   420.43 (137,16)
 41(  1.15,   .96)   609.29 ( 65, 8)   454.19 (145,16)   417.30 (174,16)   403.50 (161,16)   394.44 (159,16)
 42(  1.30,   .75)   526.63 (174,16)   311.38 (210,16)   263.75 (198,16)   248.67 (247,16)   240.44 (159,16)
 43(  1.41,   .51)   309.28 (247,16)   291.26 (174,16)   284.10 (198,16)   241.89 (156,16)   206.43 (139,16)
 44(  1.48,   .26)   322.41 (219,16)   223.83 (156,16)   182.87 (160,16)   174.31 (247,16)   155.23 (198,16)
 45(  1.50,   .00)   354.94 (219,16)   203.46 (136,16)   188.19 (156,16)    73.47 (222,16)    73.05 (210,16)
 46(  1.48,  -.26)   229.90 (136,16)   215.40 (219,16)   125.86 (247,16)   114.13 (156,16)    86.32 (205,16
 47(  1.41,  -.51)   391.52 (162,16)   316.62 (247,16)   259.31 (155,16)   223.86 (205,16)   200.25 (176- 6)
 48(  1.30,  -.75)   577.19 (162,16)   498.91 (156,16)   361.59 (185,16)   315.98 (176,16)   305.83 (247,16)
 49(  1.15,  -.96)   556.85 (203,16)   473.16 (185,16)   444.13 (187,16)   387.11 (155,16)   305.60 (136,16)
 50(   .96, -1.15)   728.59 (203,16)   469.70 (187,16)   383.16 (192,16)   369.71 (185,16)   313.64 (244,16)
 51(   .75, -1.30)   500.35 (142,16)   405.20 (203,16)   243.76 (150,16)   138.72 (185,16)   124.98 (138,16)
 52(   .51, -1.41)   324.65 (142,16)   228.74 (150,16)   166.49 (179,16)   156.45 (203,16)   123.73 (252,16)
 53(   .26, -1.48)   558.07 (150,16)   476.33 (179,16)   350.70 (135,16)   304.26 (205,16)   302.38 (244,16)
 54(   .00, -1.50)   403.07 (150,16)   325.16 (208,16)   236.30 (204,16)   227.66 (221,16)   219.77 (179,16)
 55(  -.26, -1.48)   223.58 (208,16)   124.21 (163,16)   114.59 (168,16)   107.37 (150,16)    89.84 (218,16)
 56(  -.51, -1.41)   351.04 (163,16)   275.93 (141,16)   199.74 (218,16)   168.85 (217,16)   167.49 (168,16)
 57(  -.75, -1.30)   546.17 (163,16)   433.46 (115,16)   380.31 (222,16)   321.99 (177,16)   319.31 (141,16)
 58(  -.96, -1.15)   471.65 (115,16)   424.96 (163,16)   410.02 (116,16)   403.70 (227,16)   325.74 (192,16)
 59(  -1.15,   -.96)    441.03  (207,16)    331.08  (115,16)    273.29  (201,16)    253.41  (228,16)    247.95  (192,16)
 60(  -1.30,   -.75)    453.39  (115,16)    326.28  (207,16)    299.41  (202,16)    273.26  (136,16)    270.68  (178,16)
 61(  -1.41,   -.51)    334.79  (115,16)    294.56  (177,16)    272.43  (178,16)    236.50  (202,16)    227.40  (146,16)
 62(  -1.48,   -.26)    331.52  (178,16)    286.85  (146,16)    261.16  (204,16)    259.59  (206,16)    189.04  (177,16)
 63(  -1.50,    .00)    420.75  (178,16)    390.37  (204,16)    305.40  (206,16)    177.09  (227,16)    146.53  (179,16)
 64(  -1.48,    .26)    307.05  (204,16)    281.64  (213,16)    254.79  (178,16)    216.87  (124,16)    192.28  (206,16)
 65(  -1.41,    .51)    336.48  (213,16)    291.75  (180,16)    176.13  (124,16)    116.28  (204,16)    115.35  (193,16)
 66(  -1.30,    .75)    195.82  (180,16)    186.17  (213,16)    107.19  (129,16)    106.88  (229,16)     94.75  (181,16)
 67(  -1.15,    .96)    248.15  (201,16)    233.77  (169,16)    144.81  (173,16)    139.19  (122,16)    131.82  (275,16)
 68(   -.96,   1.15)    378.06  (201,16)    226.86  (169,16)    215.12  (164,16)    180.54  (125,16)    173.38  (213,16)
 69(   -.75,   1.30)    262.50  (201,16)    227.78  (214,16)    186.03  (174,16)    174.49  (169,16)    170.30  (164,16)
 70(   -.51,   1.41)    275.21  (174,16)    192.38  (178,16)    191.47  (125,16)    160.46  (214,16)    120.78  (169,16)
 71(   -.26,   1.48)    252.53  (209,16)    240.85  (199,16)    240.42  (178,16)    186.70  (174,16)    180.35  (193,16)
 72(    .00,   1.50)    359.35  (199,16)    347.31  (209,16)    243.31  (193,16)    164.10  (164,16)    148.38  (156,16)
 73(    .35,   1.97)    364.79  (164,16)    341.94  (139,16)    193.80  (209,16)    174.25  (199,16)    152.33  (172,16)
 74(    .68,   1.88)    495.17  (164,16)    462.46  (139,16)    293.29  (209,16)    275.45  (125,16)    274.57  (197,16)
 75(   1.00,   1.73)    527.28  (197,16)    441.57  (209,16)    398.39  (126,16)    307.32  (112,16)    305.17  (299,16)
 76(   1.29,   1.53)    612.16  (197,16)    424.65  (126,16)    314.71  (137,16)    302.10  (175,16)    284.24  ( 87,16)
 77(   1.53,   1.29)    469.58  ( 65, 8)    455.87  (159,16)    423.32  (197,16)    418.99  (185,16)    374.71  (210,16)
 78(   1.73,   1.00)    556.39  (174,16)    484.65  (210,16)    456.44  (159,16)    356.30  ( 87,16)    302.77  (200,16)
 79(   1.88,    .68)    339.97  (156,16)    307.21  (247,16)    287.37  (198,16)    284.94  (174,16)    273.05  (200,16)
 80(   1.97,    .35)    342.30  (156,16)    262.73  (160,16)    258.63  (219,16)    219.32  (215,16)    218.28  (269,16)
 81(   2.00,    .00)    307.31  (156,16)    291.62  (219,16)    189.38  (136,16)    171.57  (176,16)    162.92  (230,16)
 82(   1.97,   -.35)    305.99  (156,16)    237.86  (131,16)    235.66  (219,16)    226.40  (176,16)    224.05  (166,16)
 83(   1.88,   -.68) *  811.04  (162,16)    584.68  ( 20,16)    387.39  (155,16)    386.63  (247,16)    380.41  (100,16)
 84(   1.73,  -1.00)    698.93  (162,16)    588.28  (155,16)    326.38  (185,16)    325.73  (247,16)    317.03  (176,16)
 85(   1.53,  -1.29)    520.67  (203,16)    503.46  (187,16)    461.43  (155,16)    387.60  (185,16)    245.03  (138,16)
 86(   1.29,  -1.53)    621.63  (203,16)    470.90  (187,16)    389.97  (204,16)    318.03  (138,16)    308.16  ( 91,16)
 87(   1.00,  -1.73)    403.87  (182,16)    315.76  (203,16)    197.17  (278,16)    192.82  (150,16)    189.10  (106,16)
 88(    .68,  -1.88)    258.55  (182,16)    237.53  (150,16)    228.51  (179,16)    197.03  (252,16)    192.52  (138,16)
 89(    .35,  -1.97)    430.88  (150,16)    372.91  (179,16)    231.19  (205,16)    211.36  (244,16)    165.17  (138,16)
 90(    .00,  -2.00)    391.58  (150,16)    277.91  (208,16)    271.00  (204,16)    221.67  (221,16)    204.91  (179,16)
 91(   -.35,  -1.97)    360.17  (218,16)    354.49  (290,16)    255.43  (141,16)    239.06  (168,16)    221.56  (217,16)
 92(   -.68,  -1.88)    552.35  (181,16)    434.02  (218,16)    415.08  (217,16)    353.51  (163,16)    280.93  (168,16)
 93(  -1.00,  -1.73)    546.45  (163,16)    497.43  (115,16)    397.47  (222,16)    370.55  (181,16)    351.51  (168,16)
 94(  -1.29,  -1.53)    602.66  (116,16)    523.10  (115,16)    441.95  (222,16)    427.60  (163,16)    370.54  (192,16)
 95(  -1.53,  -1.29)    430.87  (192,16)    373.34  (115,16)    320.20  (207,16)    255.51  (163,16)    242.49  (219,16)
 96(  -1.73,  -1.00)    431.10  (115,16)    376.66  (219,16)    284.55  (202,16)    271.26  (177,16)    266.45  (192,16)
 97(  -1.88,   -.68)    348.04  (146,16)    319.96  (177,16)    290.24  (115,16)    287.30  (178,16)    234.08  (202,16)
 98(  -1.97,   -.35)    427.38  (146,16)    358.20  (178,16)    262.60  (206,16)    192.49  (204,16)    167.42  (177,16)
 99(  -2.00,    .00)    488.54  (178,16)    321.23  (206,16)    317.60  (204,16)    193.51  (122,16)    193.04  (146,16)
100(  -1.97,    .35)    356.25  (124,16)    306.28  (178,16)    284.37  (213,16)    262.27  (204,16)    258.58  (180,16)
101(  -1.88,    .68)    407.98  (180,16)    393.80  (213,16)    286.47  (124,16)    172.36  (181,16)    159.85  (202,16)
102(  -1.73,   1.00)    287.23  (180,16)    252.58  (213,16)    189.82  (181,16)    170.67  (124,16)    163.39  (229,16)
103(  -1.53,   1.29)    353.74  (169,16)    247.65  (122,16)    245.52  (275,16)    224.51  (173,16)    203.30  (180,16)
104(  -1.29,   1.53)    358.95  (169,16)    311.95  (201,16)    279.41  (250,16)    235.45  (213,16)    217.78  (188,16)
105(  -1.00,   1.73)    268.42  (169,16)    247.50  (181,16)    230.85  (214,16)    207.13  (201,16)    187.55  (193,16)
106(   -.68,   1.88)    262.52  (125,16)    228.76  (178,16)    196.76  (277,16)    196.31  (169,16)    178.42  (214,16)
107(   -.35,   1.97)    266.74  (125,16)    193.49  (178,16)    174.77  (158,16)    156.43  (209,16)    153.46  (199,16)
108(    .00,   2.00)    260.35  (158,16)    238.19  (199,16)    226.44  (209,16)    191.82  (193,16)    144.82  (125,16)
109(    .66,   3.74)    292.00  (139,16)    234.79  (164,16)    197.84  (188,16)    189.76  (102,16)    188.16  (136,16)
110(   1.30,   3.57)    388.13  (164,16)    339.20  (139,16)    315.07  (306,16)    304.78  ( 74,16)    304.20  (125,16)
111(   1.90,   3.29)    674.02  (359,16)    528.18  ( 93,24)    499.00  (282,16)    469.64  (358,24)    436.86  (241,16)
112(   2.44,   2.91)    549.83  (316,16)    500.27  (126,16)    497.15  ( 76,20)    483.60  (197,16)    479.58  (224,16)
113(   2.91,   2.44)    316.55  (159,16)    270.25  (264,16)    268.01  ( 87,16)    259.00  (197,16)    256.05  (260,16)
114(   3.29,   1.90)    414.30  (159,16)    401.79  (210,16)    397.55  (174,16)    343.97  ( 87,16)    272.63  (223,16)
115(   3.57,   1.30)    370.13  (248,16)    339.28  (210,16)    327.60  (156,16)    310.20  (140,16)    309.90  (160,16)
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116(  3.74,   .66)   616.71 ( 86,16) *  612.44 (236,16)   542.14 ( 86, 8)   532.52 (216,16)   458.56 (269,16)
117(  3.80,   .00)   568.56 ( 86,24)    513.25 ( 10, 8)   424.76 (230,16)   412.22 ( 38,24)   401.00 (105,16)
118(  3.74,  -.66)   431.58 ( 99,24)    403.21 ( 77,16)   375.00 (166,16)   352.00 (131,16)   350.45 ( 99,16)
119(  3.57, -1.30)   562.69 (162,16)    486.45 ( 20,16)   418.07 ( 32,16)   388.80 (280,16)   362.48 (231,16)
120(  3.29, -1.90)   738.55 ( 98,24)    609.17 (162,16)   526.20 ( 70,16)   454.61 (155,16)   425.55 ( 99, 8)
121(  2.91, -2.44)   519.30 (353, 8)    501.11 ( 90,16)   415.03 (187,16)   406.83 (203,16)   395.41 (267,16)
122(  2.44, -2.91)   362.07 (203,16)    337.69 (280,16)   310.87 (187,16)   295.27 (244,16)   293.02 (291,16)
123(  1.90, -3.29)   429.92 (134,16)    418.10 (278,16)   382.33 (291,16)   365.23 ( 47,16)   355.99 (335,16)
124(  1.30, -3.57)   360.70 (289,16)    348.25 (135,16)   322.06 (291,16)   309.61 (335,16)   293.15 ( 47,16)
125(   .66, -3.74)   480.74 (150,16)    375.02 (205,16)   319.98 (179,16)   314.63 (135,16)   302.97 ( 13,16)
126(   .00, -3.80)   314.88 (150,16)    314.10 (208,16)   300.52 (196,16)   290.08 (221,16)   237.51 (249,16)
127(  -.66, -3.74)   641.99 (290,16)    386.79 (218,16)   280.95 (217,16)   279.19 (255,16)   260.93 ( 41,24)
128( -1.30, -3.57)   426.79 (141,16)    403.16 (219,16)   401.05 (217,16)   269.56 (290,16)   247.29 (227,16)
129( -1.90, -3.29)   335.45 (163,16)    315.10 (115,16)   264.52 (227,16)   262.52 (168,16)   235.02 (222,16)
130( -2.44, -2.91)   427.60 (116,16)    294.82 (115,16)   262.63 (222,16)   241.79 (245,16)   231.74 (163,16)
131( -2.91, -2.44)   393.77 (192,16)    328.50 (116,16)   287.97 (115,16)   217.00 (163,16)   199.21 (219,16)
132( -3.29, -1.90)   373.58 (219,16)    321.33 (115,16)   283.84 (116,16)   277.75 (192,16)   256.54 (177,16)
133( -3.57, -1.30)   389.62 (146,16)    274.26 (153,16)   272.92 (177,16)   238.85 (288,16)   230.28 (274,16)
134( -3.74,  -.66)   396.97 (146,16)    253.58 (206,16)   225.24 (178,16)   157.55 (304,16)   150.13 (228,16)
135( -3.80,   .00)   344.44 (178,16)    291.63 (206,16)   258.51 (289,16)   214.52 (122,16)   213.58 (229,16)
136( -3.74,   .66)   468.42 (124,16)    309.95 (180,16)   264.12 (213,16)   240.47 (206,16)   219.50 (178,16)
137( -3.57,  1.30)   468.94 (180,16)    462.60 (213,16)   382.76 (124,16)   206.87 (181,16)   174.61 (202,16)
138( -3.29,  1.90)   324.50 (213,16)    322.65 (180,16)   270.07 (181,16)   231.48 (250,16)   217.81 (275,16)
139( -2.91,  2.44)   344.75 (122,16)    327.77 (169,16)   295.09 (275,16)   220.62 (180,16)   220.34 (250,16)
140( -2.44,  2.91)   346.36 (250,16)    324.98 (169,16)   267.81 (201,16)   265.41 (193,16)   240.51 (102,16)
141( -1.90,  3.29)   329.48 (214,16)    294.61 (181,16)   243.25 (342,16)   241.54 (169,16)   238.09 (193,16)
142( -1.30,  3.57)   233.57 (125,16)    198.18 (332,16)   192.67 (277,16)   190.60 (214,16)   182.83 (169,16)
143(  -.66,  3.74)   292.14 (125,16)    204.49 (158,16)   182.77 (200,16)   168.08 ( 43,16)   147.35 (178,16)
144(   .00,  3.80)   274.73 (158,16)    182.30 (125,16)   179.18 (102,16)   150.77 (265,16)   143.54 (136,16)
145(  1.08,  6.11)   178.53 (139,16)    170.71 (188,16)   166.41 (329,16)   154.87 ( 73,16)   144.27 (136,16)
146(  2.12,  5.83)   223.93 (164,16)    200.15 (139,16)   194.13 (277,16)   184.21 (306,16)   161.02 (125,16)
147(  3.10,  5.37)   219.55 (209,16)    218.78 (264,16)   217.96 ( 14,16)   209.09 (126,16)   182.30 (251,16)
148(  3.99,  4.75)   284.73 (126,16)    293.40 (264,16)   236.32 ( 56,16)   230.03 (197,16)   220.34 (316,16)
149(  4.75,  3.99)   249.54 (264,16)    231.93 (159,16)   221.18 (260,16)   216.18 (144,16)   205.65 (302,16)
150(  5.37,  3.10)   297.30 (159,16)    271.61 (210,16)   241.47 (174,16)   238.34 ( 87,16)   221.60 (248,16)
151(  5.83,  2.12)   540.29 (140,16)    393.78 (165,16)   371.97 (248,16)   351.74 (295,16)   338.33 (355, 8)
152(  6.11,  1.08)   428.68 ( 86,16)    418.32 (236,16)   394.11 ( 86, 8)   365.28 (216,16)   335.05 (294,16)
153(  6.20,   .00)   442.12 ( 10, 8)    436.13 ( 86,24)   361.93 ( 38,24)   323.60 (  4,16)   302.79 (105,16)
154(  6.11, -1.08)   366.29 (326, 8)    344.58 ( 99,24)   291.69 (293, 8)   290.72 ( 81,16)   276.43 ( 99,16)
155(  5.83, -2.12)   342.57 ( 32,16)    331.50 (162,16)   323.85 ( 20,16)   297.01 (269,16)   295.61 ( 99,16)
156(  5.37, -3.10)   624.60 ( 98,24)    444.68 ( 70,16)   381.63 ( 99, 8)   364.81 (162,16)   348.25 (283,16)
157(  4.75, -3.99)   432.36 (353, 8)    395.72 ( 90,16)   338.90 ( 81,24)   319.91 (221,24)   267.29 (267,16)
158(  3.99, -4.75)   273.17 (280,16)    254.15 (335, 8)   239.74 ( 57, 8)   230.34 (341, 8)   214.14 (203,16)
159(  3.10, -5.37)   326.42 ( 47,16)    316.19 (361,16)   314.01 (278,16)   292.13 (106,16)   288.10 (335,16
160(  2.12, -5.83)   287.00 (335,16)    267.32 (249,16)   254.94 (335, 8)   246.74 (135, 8)   246.31 (352  6)
161(  1.08, -6.11)   308.22 (150,16)    221.31 (249, 8)   286.05 (344,24)   265.98 (340,24)   236.13 (205,16)
162(   .00, -6.20)   305.87 (211,24)    254.01 ( 78, 8)   226.37 (186,16)   224.94 (361,24)   207.79 ( 41,24)
163( -1.08, -6.11)   452.74 (290,16)    245.24 (218,16)   225.12 ( 41,24)   217.95 (150, 8)   217.46 (255,16)
164( -2.12, -5.83)   358.84 (218,16)    349.99 (141,16)   311.05 (217,16)   271.01 (362, 8)   270.31 (255,24)
165( -3.10, -5.37)   235.39 (115,16)    225.28 (163,16)   217.43 (255,24)   189.09 ( 78,16)   182.35 (168,16)
166( -3.99, -4.75)   279.70 (116,16)    187.31 (285,16)   172.67 (115,16)   160.24 ( 12,24)   155.63 (141,16)
167( -4.75, -3.99)   253.85 (116,16)    226.25 (192,16)   211.57 (115,16)   148.38 (298,16)   145.47 (257,16)
168( -5.37, -3.10)   233.16 (288,16)    232.70 (219,16)   230.81 (116,16)   214.24 (115,16)   193.62 (305,16)
169( -5.83, -2.12)   229.83 (157,16)    227.63 (288,16)   225.65 (186,16)   210.61 (116,24)   194.15 (274,16)
170( -6.11, -1.08)   458.23 ( 74,24)    367.63 ( 36,24)   277.49 ( 64,24)   276.14 (239,24)   263.10 (213, 8)
171( -6.20,   .00)   230.61 (289,16)    212.98 (229,16)   201.82 (178,16)   174.34 (151,16)   174.34 (123,16)
172( -6.11,  1.08)   325.24 (124,16)    204.62 (180,16)   193.31 ( 79,16)   183.33 (213,16)   178.90 (229,16)
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 173(  -5.83,   2.12)    334.80  (213,16)     322.08  (180,16)     265.21  (124,16)     164.90  ( 11,16)     127.48  (181,16)
 174(  -5.37,   3.10)    228.87  (213,16)     215.05  (181,16)     213.37  (180,16)     180.06  (193,16)     178.97  (250,16)
 175(  -4.75,   3.99)    276.18  (122,16)     291.76  (132,16)     216.25  (169,16)     207.67  (275,16)     194.95  (117,24)
 176(  -3.99,   4.75)    306.91  (103,24)     296.72  (250,16)     272.08  (319,16)     231.23  ( 73,16)     227.54  (102,16)
 177(  -3.10,   5.37)    369.99  (214,16)     316.90  (332,16)     240.12  ( 92,16)     215.26  (103,16)     214.18  (181,16)
 178(  -2.12,   5.83)    290.11  (332,16)     192.30  ( 19,16)     177.64  ( 92,16)     169.27  (103,16)     156.43  (214,16)
 179(  -1.08,   6.11)    192.99  ( 66,16)     180.65  ( 43,16)     172.69  (125,16)     154.70  ( 73,16)     154.66  (240,24)
 180(    .00,   6.20)    153.07  (158,16)     148.39  (183,24)     137.53  (102,16)     128.30  (265,16)     124.03  ( 66,16)

                          FIVE HIGHEST 24-HOUR SO2  CONCENTRATIONS(ENDING ON  JULIAN DAY, HOUR)
                                                   (MICROGRAMS/M**3)

 RECEPTOR                          1                    2                    3                    4                    5

   1(    .16,    .89)    129.95  (199,24)     123.20  (209,24)      98.95  (139,24)      78.74  (164,24)      46.73  (193,24)
   2(    .31,    .85)    120.46  (139,24)      81.71  (164,24)      70.22  (207,24)      43.50  (199,24)      41.46  (209,24)
   3(    .45,    .78)     79.65  (139,24)      73.66  (207,24)      33.26  (164,24)      22.38  (185,24)      18.27  (197,24)
   4(    .58,    .69)     64.32  (185,24)      34.99  (207,24)      30.80  (182,24)      28.42  (139,24)      12.10  (160,24)
   5(    .69,    .58)     86.38  (185,24)      39.62  (142,24)      35.96  (174,24)      32.55  (198,24)      16.46  (160,24)
   6(    .78,    .45)     78.39  (198,24)      54.61  (185,24)      52.85  (174,24)      21.41  (142,24)       9.68  (247,24)
   7(    .85,    .31)     79.21  (198,24)      35.03  (174,24)      18.72  (185,24)      14.43  (247,24)      13.35  (219,24)
   8(    .89,    .16)     39.91  (198,24)      36.86  (136,24)      35.33  (219,24)      10.06  (174,24)       9.16  (160,24)
   9(    .90,    .00)     72.15  (136,24)      37.64  (219,24)       7.76  (198,24)       5.76  (156,24)       4.67  (210,24)
  10(    .89,   -.16)     67.97  (136,24)      27.02  (205,24)      17.83  (219,24)       4.75  (223,24)       3.90  (247,24)
  11(    .85,   -.31)     69.13  (205,24)      41.50  (136,24)      17.32  (185,24)      10.82  (247,24)       6.38  (155,24)
  12(    .78,   -.45)     80.18  (205,24)      80.05  (185,24)      58.89  (136,24)      34.14  (187,24)      29.79  (203,24)
  13(    .69,   -.58)    160.08  (185,24)     105.28  (203,24)      85.26  (136,24)      82.15  (187,24)      47.46  (205,24)
  14(    .58,   -.69)    181.62  (203,24)     153.99  (185,24)     111.19  (182,24)      93.68  (187,24)      69.36  (136,24)
  15(    .45,   -.78)    163.43  (207,24)     148.23  (142,24)      97.89  (150,24)      69.78  (185,24)      48.84  (187,24)
  16(    .31,   -.85)     87.70  (182,24)      79.25  (150,24)      76.27  (203,24)      51.99  (135,24)      34.55  (179,24)
  17(    .16,   -.89)     47.28  (150,24)      37.37  (208,24)      28.95  (179,24)      19.08  (142,24)      16.50  (203,24)
  18(    .00,   -.90)     69.70  (208,24)      19.78  (150,24)       8.27  (179,24)       4.81  (163,24)       4.41  (208,24)
  19(   -.16,   -.89)     64.89  (208,24)      27.79  (163,24)       4.94  (150,24)       4.01  (208,24)       3.92  (168,24)
  20(   -.31,   -.85)     61.33  (163,24)      28.36  (208,24)      21.53  (204,24)      11.12  (146,24)       5.01  (177,24)
  21(   -.45,   -.78)     62.53  (163,24)      56.85  (208,24)      45.72  (146,24)      26.58  (228,24)      19.78  (207,24)
  22(   -.58,   -.69)     77.58  (146,24)      66.32  (208,24)      61.10  (207,24)      59.70  (228,24)      46.08  (201,24)
  23(   -.69,   -.58)     82.57  (207,24)      73.89  (222,24)      67.98  (201,24)      62.25  (146,24)      61.07  (228,24)
  24(   -.78,   -.45)     75.74  (133,24)      68.84  (222,24)      68.45  (202,24)      67.29  (115,24)      66.87  (178,24)
  25(   -.85,   -.31)     78.58  (177,24)      75.78  (143,24)      55.51  (115,24)      50.48  (202,24)      44.24  (179,24)
  26(   -.89,   -.16)     81.95  (179,24)      80.49  (208,24)      63.48  (206,24)      59.15  (177,24)      40.62  (227,24)
  27(   -.90,    .00)     89.50  (208,24)      75.53  (227,24)      71.57  (179,24)      70.03  (206,24)      22.99  (177,24)
  28(   -.89,    .16)     66.96  (227,24)      49.51  (208,24)      36.52  (206,24)      36.32  (213,24)      28.94  (179,24)
  29(   -.85,    .31)     41.74  (213,24)      28.52  (227,24)      21.38  (180,24)      11.80  (204,24)      11.47  (193,24)
  30(   -.78,    .45)     30.59  (180,24)      24.25  (213,24)      20.20  (125,24)      18.28  (201,24)      14.77  (164,24)
  31(   -.69,    .58)     75.62  (201,24)      74.69  (125,24)      66.09  (164,24)      58.99  (169,24)      38.43  (180,24)
  32(   -.58,    .69)    106.09  (201,24)     114.19  (164,24)     102.29  (125,24)      49.72  (214,24)      43.69  (213,24)
  33(   -.45,    .78)    101.53  (214,24)      80.00  (164,24)      72.51  (125,24)      68.76  (201,24)      36.04  (174,24)
  34(   -.31,    .85)     55.39  (214,24)      51.04  (178,24)      47.47  (209,24)      37.71  (178,24)      37.45  (199,24)
  35(   -.16,    .89)    134.93  (209,24)     123.38  (199,24)      56.15  (193,24)      46.05  (178,24)      32.29  (174,24)
  36(    .00,    .90)    180.81  (209,24)     190.47  (199,24)      74.17  (193,24)      39.30  (139,24)      33.34  (164,24)
  37(    .26,   1.48)    139.77  (164,24)     115.00  (139,24)      88.57  (199,24)      88.43  (209,24)      51.40  (193,24)
  38(    .51,   1.41)    161.75  (164,24)     161.74  (139,24)      73.91  (209,24)      73.52  (197,24)      70.73  (207,24)
  39(    .75,   1.30)    151.25  (197,24)     125.15  (139,24)     101.57  (126,24)      99.55  (112,24)      99.29  (209,24)
  40(    .96,   1.15)    236.26  (197,24)     200.65  (145,24)     190.85  (161,24)     178.59  (317,24)     169.87  ( 61,24)
  41(   1.15,    .96)    208.39  ( 65,24)     162.59  (145,24)     161.57  (160,24)     160.31  (197,24)     139.12  (174,24)
  42(   1.30,    .75)    175.65  (174,24)     103.79  (210,24)      88.39  (198,24)      82.89  (247,24)      80.20  (159,24)
  43(   1.41,    .51)    103.09  (247,24)      97.51  (178,24)      95.00  (198,24)      81.24  (156,24)      68.81  (139,24)
 44(  1.48,   .26)   107.47 (219,24)    75.07 (156,24)    60.96 (160,24)    58.10 (247,24)    51.75 (198,24)
 45(  1.50,   .00)   118.28 (219,24)    81.15 (136,24)    62.75 (156,24)    27.61 (215,24)    24.49 (222,24)
 46(  1.48,  -.26)    76.63 (134,24)    71.80 (219,24)    41.95 (247,24)    38.04 (156,24)    28.77 (205,24)
 47(  1.41,  -.51)   130.51 (162,24)   105.54 (247,24)    86.45 (155,24)    76.39 (176,24)    74.62 (205,24)
 48(  1.30,  -.75)   192.40 (162,24)   166.30 (155,24)   120.55 (185,24)   106.16 (176,24)   101.94 (247,24)
 49(  1.15,  -.96)   185.62 (203,24)   157.74 (185,24)   148.05 (187,24)   129.04 (155,24)   101.87 (136,24)
 50(   .96, -1.15)   243.55 (203,24)   156.57 (187,24)   153.62 ( 91,24)   130.96 (142,24)   130.73 (185,24)
 51(   .75, -1.30)   167.20 (142,24)   137.15 (203,24)    81.32 (150,24)    46.45 (185,24)    44.42 (138,24)
 52(   .51, -1.41)   108.22 (142,24)    76.31 (150,24)    57.41 (179,24)    52.95 (203,24)    41.32 (138,24)
 53(   .26, -1.48)   187.04 (150,24)   169.06 (179,24)   144.14 (135,24)   106.83 (138,24)   101.42 (205,24)
 54(   .00, -1.50)   138.79 (150,24)   109.56 (208,24)    96.11 (221,24)    78.77 (204,24)    73.19 (179,24)
 55(  -.26, -1.48)    74.53 (208,24)    41.40 (163,24)    38.76 (150,24)    38.20 (168,24)    29.61 (218,24)
 56(  -.51, -1.41)   117.01 (163,24)    92.95 (181,24)    66.49 (218,24)    56.33 (217,24)    55.84 (168,24)
 57(  -.75, -1.30)   182.90 (163,24)   152.07 (115,24)   126.78 (222,24)   123.34 (141,24)   115.10 (177,24)
 58(  -.96, -1.15)   190.54 (115,24)   142.44 (163,24)   136.68 (116,24)   134.59 (222,24)   109.33 (212,24)
 59( -1.15,  -.96)   147.02 (207,24)   111.15 (115,24)    91.10 (201,24)    84.50 (228,24)    82.72 (192,24)
 60( -1.30,  -.75)   151.14 (115,24)   108.82 (207,24)    99.80 (202,24)    91.09 (136,24)    90.24 (178,24)
 61( -1.41,  -.51)   111.59 (115,24)    98.19 (177,24)    91.48 (178,24)    78.83 (202,24)    75.80 (146,24)
 62( -1.48,  -.26)   115.42 (178,24)    95.62 (146,24)    87.05 (204,24)    86.53 (206,24)    63.01 (177,24)
 63( -1.50,   .00)   147.01 (178,24)   130.12 (204,24)   101.87 (206,24)    59.03 (227,24)    48.84 (179,24)
 64( -1.48,   .26)   102.35 (204,24)    93.95 (213,24)    86.84 (178,24)    81.07 (124,24)    64.09 (206,24)
 65( -1.41,   .51)   113.87 (213,24)    98.06 (180,24)    65.96 (124,24)    38.76 (204,24)    38.45 (193,24)
 66( -1.30,   .75)    72.29 (180,24)    63.10 (213,24)    37.00 (124,24)    35.63 (229,24)    32.57 (181,24)
 67( -1.15,   .96)    82.78 (201,24)    78.55 (169,24)    48.27 (173,24)    47.70 (122,24)    44.79 (180,24)
 68(  -.96,  1.15)   124.69 (201,24)    75.63 (169,24)    71.71 (164,24)    60.53 (125,24)    58.44 (213,24)
 69(  -.75,  1.30)    87.50 (201,24)    75.93 (214,24)    62.30 (174,24)    58.16 (169,24)    56.77 (168,24)
 70(  -.51,  1.41)    91.74 (174,24)    64.68 (175,24)    64.13 (178,24)    53.49 (214,24)    40.26 (169,24)
 71(  -.26,  1.48)    84.18 (209,24)    80.28 (199,24)    80.14 (178,24)    62.23 (174,24)    60.12 (193,24)
 72(   .00,  1.50)   119.78 (199,24)   115.77 (209,24)    81.10 (193,24)    54.70 (164,24)    49.46 (158,24)
 73(   .35,  1.97)   121.60 (164,24)   113.98 (139,24)    64.60 (209,24)    58.08 (199,24)    50.78 (172,24)
 74(   .68,  1.88)   165.20 (164,24)   155.08 (139,24)   116.78 (197,24)    99.22 (125,24)    97.76 (209,24)
 75(  1.00,  1.73)   184.47 (197,24)   163.61 (126,24)   147.20 (209,24)   136.87 (112,24)   115.18 (139,24)
 76(  1.29,  1.53)   206.65 (197,24)   153.76 (126,24)   118.38 (185,24)   114.50 (161,24)   106.60 (137,24)
 77(  1.53,  1.29)   180.41 (197,24)   167.28 (160,24)   160.35 ( 65,24)   154.46 (145,24)   151.96 (159,24)
 78(  1.73,  1.00)   186.69 (174,24)   161.55 (210,24)   152.90 (159,24)   118.77 ( 87,24)   105.16 (160,24)
 79(  1.88,   .68)   116.52 (156,24)   102.40 (247,24)    98.69 (174,24)    97.86 (198,24)    91.02 (200,24)
 80(  1.97,   .35)   117.29 (156,24)    87.58 (160,24)    86.21 (219,24)    84.74 (215,24)    74.81 (269,24)
 81(  2.00,   .00)   102.55 (156,24)    97.21 (219,24)    63.51 (215,24)    63.11 (136,24)    59.24 (230,24)
 82(  1.97,  -.35)   102.00 (156,24)    91.12 (176,24)    82.24 (131,24)    78.55 (219,24)    74.68 (166,24)
 83(  1.88,  -.68)   270.35 (162,24)   226.54 ( 20,24)   158.95 (100,24)   145.22 (176,24)   129.18 (155,24)
 84(  1.73, -1.00)   231.66 (162,24)   196.09 (155,24)   108.90 (185,24)   108.58 (247,24)   107.48 (176,24)
 85(  1.53, -1.29)   173.56 (203,24)   167.84 (187,24)   153.81 (155,24)   129.32 (185,24)   109.51 (221,24)
 86(  1.29, -1.53)   200.77 (203,24)   160.62 ( 91,24)   156.97 (187,24)   137.59 (138,24)   133.28 (244,24)
 87(  1.00, -1.73)   135.68 (142,24)   118.59 (203,24)    66.09 (278,24)    65.64 (138,24)    65.01 (150,24)
 88(   .68, -1.88)    86.29 (142,24)    85.57 (179,24)    80.06 (150,24)    68.35 (138,24)    65.68 (252,24)
 89(   .35, -1.97)   144.56 (150,24)   133.04 (179,24)    77.04 (205,24)    70.47 (244,24)    63.53 (138,24)
 90(   .00, -2.00)   139.62 (150,24)    97.58 (221,24)    92.42 (208,24)    90.33 (204,24)    68.76 (179,24)
 91(  -.35, -1.97)   120.06 (218,24)   118.17 (290,24)    95.09 (150,24)    85.37 (141,24)    82.82 (168,24)
 92(  -.68, -1.88)   148.98 (141,24)   146.97 (218,24)   139.76 (217,24)   117.84 (163,24)    93.83 (168,24)
 93( -1.00, -1.73)   187.44 (163,24)   176.41 (115,24)   164.70 (141,24)   132.54 (222,24)   130.41 (177,24)
 94( -1.29, -1.53)   237.45 (115,24)   200.97 (116,24)   172.84 (256,24)   159.62 (141,24)   147.46 (222,24)
 95( -1.53, -1.29)   148.75 (192,24)   128.70 (115,24)   107.17 (207,24)    85.26 (163,24)    83.48 (219,24)
 96( -1.73, -1.00)   143.76 (115,24)   136.87 (219,24)    94.85 (202,24)    93.25 (177,24)    92.03 (192,24)
 97( -1.88,  -.68)   116.01 (146,24)   106.71 (177,24)    97.77 (178,24)    96.75 (115,24)    78.0  (202,24)
 98( -1.97,  -.35)   142.45 (146,24)   133.85 (178,24)    87.57 (206,24)    64.16 (204,24)    55.81 (171,24)
 99( -2.00,   .00)   183.00 (178,24)   107.09 (206,24)   105.87 (204,24)    64.51 (146,24)    64.50 (122,24)
100( -1.97,   .35)   141.08 (178,24)   108.16 (178,24)    97.50 (180,24)    95.07 (213,24)    87.42 (204,24)
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101( -1.88,   .68)  138.32 (213,24)  137.88 (180,24)  116.14 (124,24)   60.74 (181,24)   53.28 (202,24)
102( -1.73,  1.00)  113.65 (180,24)   89.21 (213,24)   69.81 (181,24)   63.56 (124,24)   54.46 (229,24)
103( -1.53,  1.29)  120.73 (169,24)   98.56 (172,24)   81.84 (275,24)   77.45 (180,24)   74.84 (173,24)
104( -1.29,  1.53)  118.33 (169,24)  103.99 (201,24)   93.18 (250,24)   81.80 (213,24)   72.59 (188,24)
105( -1.00,  1.73)   89.47 (169,24)   82.50 (181,24)   76.95 (214,24)   69.04 (201,24)   62.53 (193,24)
106(  -.68,  1.88)   93.68 (125,24)   76.25 (179,24)   65.59 (277,24)   65.46 (169,24)   59.47 (214,24)
107(  -.35,  1.97)   89.95 (125,24)   68.50 (178,24)   58.26 (158,24)   52.14 (209,24)   51.15 (199,24)
108(   .00,  2.00)   86.78 (158,24)   79.40 (199,24)   75.48 (209,24)   63.99 (193,24)   48.28 (125,24)
109(   .66,  3.74)   97.38 (139,24)   88.67 ( 73,24)   78.77 (164,24)   66.45 (188,24)   63.25 (102,24)
110(  1.30,  3.57)  146.07 (197,24)  142.80 (317,24)  139.26 (169,24)  133.97 (127,24)  130.84 (125,24)
111(  1.90,  3.29)  378.00 (358,24)  297.41 (359,24)  291.04 (317,24)  233.35 ( 61,24)  232.73 (112,24)
112(  2.44,  2.91)  138.08 (  2,24)  322.70 (108,24)  287.53 (  3,24)  286.79 ( 61,24)  249.49 (161,24)
113(  2.91,  2.44)  114.68 (197,24)  105.52 (159,24)  172.51 (160,24)   90.08 (264,24)   89.34 ( 87,24)
114(  3.29,  1.90)  140.91 (174,24)  140.88 (159,24)  133.93 (210,24)  114.78 ( 87,24)   99.36 (160,24)
115(  3.57,  1.30)  138.72 (140,24)  126.16 (156,24)  126.03 (248,24)  113.36 (216,24)  113.09 (210,24)
116(  3.74,   .66) *  417.84 ( 86,24)  217.64 (236,24)  199.19 (216,24)  185.14 ( 10,24)  180.03 (215,24)
117(  3.80,   .00)  405.52 ( 86,24)  221.59 ( 38,24)  195.56 ( 10,24)  191.34 (  9,24)  174.14 (113,24)
118(  3.74,  -.66)  282.53 ( 99,24)  183.52 (326,24)  164.76 (131,24)  144.65 ( 38,24)  140.93 ( 77,24)
119(  3.57, -1.30)  209.48 ( 99,24)  206.15 ( 20,24)  189.00 ( 32,24)  187.56 (162,24)  151.62 (280,24)
120(  3.29, -1.90)  275.33 ( 70,24)  264.42 ( 90,24)  246.20 ( 98,24)  203.12 (162,24)  188.50 (293,24)
121(  2.91, -2.44)  228.13 ( 90,24)  210.02 (353,24)  191.38 (221,24)  154.39 ( 81,24)  138.42 (187,24)
122(  2.44, -2.91)  135.63 ( 78,24)  126.21 (278,24)  124.56 (284,24)  122.63 (203,24)  122.20 (106,24)
123(  1.90, -3.29)  159.29 (278,24)  145.28 ( 47,24)  144.91 (106,24)  131.86 (291,24)  130.84 (335,24)
124(  1.30, -3.57)  210.72 (135,24)  196.12 (335,24)  156.99 ( 47,24)  151.42 (249,24)  141.98 (186,24)
125(   .66, -3.74)  186.61 (135,24)  164.89 (150,24)  158.95 (289,24)  155.70 ( 13,24)  144.46 (179,24)
126(   .00, -3.80)  143.77 (150,24)  139.73 (221,24)  122.23 (186,24)  109.64 ( 42,24)  104.71 (204,24)
127(  -.66, -3.74)  218.42 (290,24)  173.57 (255,24)  129.26 (218,24)  120.57 (150,24)  113.80 (168,24)
128( -1.30, -3.57)  163.90 (141,24)  143.37 (217,24)  140.76 (218,24)  112.08 (227,24)  107.65 (255,24)
129( -1.90, -3.29)  123.18 (141,24)  115.68 (163,24)  112.57 (115,24)   97.06 (227,24)   96.04 (168,24)
130( -2.44, -2.91)  158.53 (115,24)  142.58 (116,24)  131.15 (256,24)  127.58 (141,24)   96.95 (212,24)
131( -2.91, -2.44)  142.07 (192,24)  115.16 (115,24)  111.99 (116,24)   73.97 (163,24)   71.44 (219,24)
132( -3.29, -1.90)  155.50 (219,24)  129.18 (192,24)  117.86 (116,24)  109.11 (115,24)  104.61 (212,24)
133( -3.57, -1.30)  117.30 (228,24)  116.54 (146,24)   91.47 (153,24)   91.17 (177,24)   79.62 (288,24)
134( -3.74,  -.66)  132.32 (146,24)  102.75 (178,24)   88.58 (206,24)   64.87 (228,24)   52.64 (304,24)
135( -3.80,   .00)  165.01 (178,24)   97.21 (206,24)   86.18 (289,24)   71.51 (122,24)   71.20 (229,24)
136( -3.74,   .66)  197.13 (124,24)  132.01 (180,24)   96.18 (178,24)   88.77 (213,24)   80.16 (206,24)
137( -3.57,  1.30)  178.01 (213,24)  177.05 (124,24)  159.29 (180,24)   93.96 (181,24)   61.93 (251,24)
138( -3.29,  1.90)  138.47 (180,24)  126.33 (181,24)  124.94 (213,24)  103.63 (250,24)   88.55 (124,24)
139( -2.91,  2.44)  131.16 (122,24)  115.89 (169,24)   98.36 (275,24)   88.19 (180,24)   86.09 (250,24)
140( -2.44,  2.91)  115.72 (250,24)  108.51 (169,24)   99.99 (193,24)   89.30 (201,24)   82.31 (122,24)
141( -1.90,  3.29)  109.83 (214,24)   98.20 (181,24)   91.16 ( 92,24)   85.30 (332,24)   80.70 (193,24)
142( -1.30,  3.57)  106.70 (125,24)   68.76 (332,24)   64.22 (277,24)   63.53 (214,24)   62.36 ( 92,24)
143(  -.66,  3.74)  101.67 (125,24)   68.16 (158,24)   60.92 (200,24)   56.38 ( 43,24)   49.12 (178,24)
144(   .00,  3.80)   91.58 (158,24)   70.82 (143,24)   60.78 (125,24)   59.73 (102,24)   53.68 (169,24)
145(  1.08,  6.11)   78.05 ( 73,24)   60.87 (183,24)   59.70 (139,24)   57.98 (188,24)   56.57 (306,24)
146(  2.12,  5.83)   79.97 (160,24)   77.76 (125,24)   76.98 (127,24)   75.13 (197,24)   69.65 (139,24)
147(  3.10,  5.37)   97.33 (139,24)   96.65 (126,24)   90.41 (112,24)   77.05 (358,24)   75.01 (359,24)
148(  3.99,  4.75)  124.92 (  2,24)  115.73 (108,24)  103.62 (  3,24)  103.41 (126,24)  103.08 ( 61,24)
149(  4.75,  3.99)   83.18 (264,24)   82.08 (197,24)   81.48 (108,24)   79.01 (145,24)   78.51 (144,24)
150(  5.37,  3.10)  109.12 ( 25,24)  106.26 (159,24)   94.40 (174,24)   90.54 (210,24)   89.22 (171,24)
151(  5.83,  2.12)  230.23 (140,24)  217.83 ( 25,24)  199.45 ( 39,24)  183.65 (130,24)  173.15 (248,24)
152(  6.11,  1.08)  299.30 ( 86,24)  171.26 ( 10,24)  154.21 (236,24)  145.74 ( 65,24)  142.88 (355,24)
153(  6.20,   .00)  291.67 ( 86,24)  197.28 ( 38,24)  167.73 (  9,24)  166.30 ( 10,24)  145.72 ( 26,24)
154(  6.11, -1.08)  224.10 ( 99,24)  205.79 (326,24)  122.57 (131,24)  120.86 ( 38,24)  100.51 ( 81,24)
155(  5.83, -2.12)  175.62 ( 99,24)  151.23 ( 32,24)  142.69 ( 20,24)  131.22 ( 51,24)  126.26 (283,24)
156(  5.37, -3.10)  236.44 ( 70,24)  229.45 ( 90,24)  208.24 ( 98,24)  197.62 (293,24)  171.71 ( 51,24)
157(  4.75, -3.99)  187.77 ( 90,24)  177.48 (353,24)  149.90 (221,24)  149.65 ( 81,24)  122.72 (293,24)
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158(   3.99,   -4.75)    130.00  (278,24)    124.53  ( 28,24)    107.42  (335,24)    103.50  (106,24)    100.82  (244,24)
159(   3.10,   -5.37)    126.52  (278,24)    126.28  ( 47,24)    114.15  (135,24)    106.98  (335,24)    106.27  (291,24)
160(   2.12,   -5.83)    180.65  (335,24)    163.26  (135,24)    147.22  (186,24)    138.82  (249,24)    126.17  (340,24)
161(   1.08,   -6.11)    182.74  (340,24)    161.66  (249,24)    146.86  (135,24)    123.44  ( 17,24)    105.57  (150,24)
162(    .00,   -6.20)    112.14  ( 82,24)    106.98  (186,24)    101.96  (211,24)     93.38  ( 13,24)     87.08  (290,24)
163(  -1.08,   -6.11)    163.28  (290,24)    134.31  (255,24)    109.49  (150,24)     96.02  (168,24)     93.71  (362,24)
164(  -2.12,   -5.83)    193.87  (217,24)    173.99  (255,24)    160.45  (141,24)    137.11  (218,24)    125.27  (257,24)
165(  -3.10,   -5.37)    131.93  (163,24)    117.88  (141,24)    101.77  (255,24)     99.68  (153,24)     86.64  (256,24)
166(  -3.99,   -4.75)    107.28  (115,24)     98.33  (256,24)     93.29  (116,24)     92.45  (141,24)     69.32  ( 12,24)
167(  -4.75,   -3.99)    112.81  (115,24)     94.17  (192,24)     93.50  (116,24)     60.88  (177,24)     52.23  (257,24)
168(  -5.37,   -3.10)    106.77  (219,24)    106.16  (192,24)    102.93  (116,24)     84.61  (212,24)     81.12  (207,24)
169(  -5.83,   -2.12)     97.09  (228,24)     96.10  (116,24)     78.18  (153,24)     77.22  ( 79,24)     76.45  (305,24)
170(  -6.11,   -1.08)    191.70  ( 79,24)    159.98  (123,24)    122.54  ( 36,24)    116.23  ( 95,24)    115.52  (239,24)
171(  -6.20,     .00)    114.75  (178,24)     77.19  (289,24)     71.15  (229,24)     67.63  (123,24)     58.26  (151,24)
172(  -6.11,    1.08)    141.94  (124,24)     95.36  (180,24)     66.72  (178,24)     64.97  ( 79,24)     61.60  (213,24)
173(  -5.83,    2.12)    136.74  (124,24)    133.73  (213,24)    110.01  (180,24)     74.79  (181,24)     64.59  (246,24)
174(  -5.37,    3.10)    118.72  (181,24)     96.56  (180,24)     91.95  (213,24)     86.18  (250,24)     85.76  (132,24)
175(  -4.75,    3.99)    108.63  (122,24)     86.45  (117,24)     82.43  (169,24)     82.22  (132,24)     69.22  (275,24)
176(  -3.99,    4.75)    136.73  ( 73,24)    127.64  (250,24)    126.60  (103,24)    123.92  (319,24)    121.68  (169,24)
177(  -3.10,    5.37)    141.39  (332,24)    127.07  (103,24)    123.33  (214,24)    121.24  ( 92,24)     98.41  (118,24)
178(  -2.12,    5.83)     99.83  (332,24)     90.21  (125,24)     78.03  ( 19,24)     66.80  ( 92,24)     65.53  (103,24)
179(  -1.08,    6.11)     76.19  (119,24)     74.03  ( 43,24)     65.69  (104,24)     64.87  ( 66,24)     62.15  (125,24)
180(    .00,    6.20)     69.94  (143,24)     52.56  (119,24)     51.78  (247,24)     51.11  (158,24)     45.84  (102,24)
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M21ADO*GUIDE(1).EXAMPLE4
     1        EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 50 RECEPTORS
     2        POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
     3        DATA INPUT BY TOM PIERCE      20 FEBRUARY 1980
     4        79,292,12,1,3,4,10,0,1.,1.,0.
     5        0,0,0,1,1,0,1,1,0,0,0,0,0,0,1,1,0,0,1,0,0,0,0,0
     6        10.,.07,.07,.1,.15,.35,.55,0.,0.,0.,0.,0.,0.
     7        1          0.5    0.7            600.    200.    430.    5.8     21.0
     8        2          0.4    1.85           225.    150.    425.    5.2     19.
     9        3          0.5    1.8            250.    150.    425.    5.2     19.
    10        4          1.75   .85            70.     80.     430.    3.6     16.
    11        5          1.75   .75            70.     80.     430.    3.6     16.
    12        6          1.75   .65            70.     80.     430.    3.6     16.
    13        7          2.4    1.5            100.    120.    415.    5.      23.
    14        8          2.5    1.6            120.    120.    415.    5.      23.
    15        9          2.5    1.5            100.    120.    415.    5.      23.
    16        10         1.8     1.85           85.    90.      420.   4.6      17.
    17        11         1.95   1.9            85.     90.     420.    4.6     17.
    18        12         2.1    1.85           85.     90.     420.    4.6     17.
    19        13         2.     1.75           60.     50.     440.    3.      15.
    20        14         1.9    1.75           60.     50.     440.    3.      15.
    21        15         2.35   1.1            5.      30.     450.    2.3     12.
    22        16         2.4    1.1            5.      30.     450.    2.3     12.
    23        17         2.45   1.1            5.      30.     450.    2.3     12.
    24        18         2.5    1.1            5.      30.     450.    2.3     12.
    25        19         2.35   1.             5.      30.     450.    2.3     12.
    26        20         2.4    1.             5.      30.     450.    2.3     12.
    27        21         2.45   1.             5.      30.     450.    2.3     12.
    28        22         2.5    1.             5.      30.     450.    2.3     12.
    29        23         .85    1.05           80.     120.    420.    4.8     18.
    30        24         .9     1.05           80.     120.    420.    4.8     18.
    31        25         .95    1.05           80.     120.    420.    4.8     18.
    32        26         1.     1.05           80.     120.    420.    4.8     18.
    33        27         .7     2.65           60.     100.    460.    4.      20.
    34        28         .7     2.6            60.     100.    460.    4.      20.
    35        29         .7     2.55           60.     100.    460.    4.      20.
    36        30         .7     2.5            60.     100.    460.    4.      20.
    37        ENDP
    38        002008027
    39        1.,0.,0.,0.,0.,2.,1.
    40        1        1.00    2.5
    41        2        1.25    2.4
    42        3        1.      2.25
    43        4        1.25    2.25
    44        5        1.2     2.
    45        6        1.5     2.
    46        7        .75     1.7
    47        8        1.      1.6
    48        9        .75     1.5
    49        10       1.      1.5
```

RUNSTREAM, EXAMPLE 4, PAGE 1

```
50      11      .95     1.25
51      12      1.25    1.25
52      13      2.      1.
53      14      2.25    1.25
54      15      3.      1.75
55      16      3.      1.5
56      17      3.25    1.5
57      18      3.5     1.5
58      19      3.5     1.25
59      20      3.      1.
60      21      3.5     1.
61      22      2.5     .75
62      23      2.75    .75
63      24      3.      .75
64      25      3.25    .75
65      26      1.25    .5
66      27      1.5     .5
67      28      1.75    .5
68      29      2.      .5
69      30      2.25    .5
70      31      2.5     .5
71      32      3.      .5
72      33      3.5     .5
73      34      .75     .25
74      35      2.25    .25
75      36      2.75    .25
76      37      .5      0.
77      38      .75     0.
78      39      1.      0.
79      40      1.25    0.
80      41      1.5     0.
81      42      1.75    0.
82      43      2.      0.
83      44      2.25    0.
84      45      2.5     0.
85      46      2.75    0.
86      47      3.      0.
87      48      3.25    0.
88      49      3.5     0.
89      50      3.5     -0.05
90      ENDREC
91      79 292 12 2 2.7 298. 290. 1800.
92      79 292 13 2 2.9 299. 320. 1850.
93      79 292 14 2 3. 299. 305. 1900.
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                                   MPTER - VERSION 79365
EXAMPLE FOUR - APPLICATION FOR 10 SOURCES AND 50 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE        20 FEBRUARY 1980

                     GENERAL INPUT INFORMATION

 THIS RUN OF MPTER-VERSION 79365 IS FOR THE POLLUTANT PART FOR   1   3-HOUR PERIODS.
 CONCENTRATION ESTIMATES BEGIN ON HOUR-12, JULIAN DAY-292, YEAR-1970.
 A FACTOR OF      1.0000000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
 10 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
THIS RUN WILL NOT CONSIDER ANY POLLUTANT LOSS.

 OPTION        OPTION LIST                          OPTION SPECIFICATION : 0= IGNORE OPTION
                                                                           1= USE OPTION
                    TECHNICAL OPTIONS
     1        TERRAIN ADJUSTMENTS                                          0
     2        DO NOT INCLUDE STACK DOWNWASH CALCULATIONS                   0
     3        DO NOT INCLUDE GRADUAL PLUME RISE CALCULATIONS               0
     4        CALCULATE INITIAL PLUME SIZE                                 1
                    INPUT OPTIONS
     5        READ MET DATA FROM CARDS                                     1
     6        READ HOURLY EMISSIONS                                        0
     7        SPECIFY SIGNIFICANT SOURCES                                  1
     8        READ RADIAL DISTANCES TO GENERATE RECEPTORS                  1
                    PRINTED OUTPUT OPTIONS
     9        DELETE EMISSIONS WITH HEIGHT TABLE                           0
    10        DELETE MET DATA SUMMARY FOR AVG PERIOD                       0
    11        DELETE HOURLY CONTRIBUTIONS                                  0
    12        DELETE MET DATA ON HOURLY CONTRIBUTIONS                      0
    13        DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS           0
    14        DELETE HOURLY SUMMARY                                        0
    15        DELETE MET DATA ON HRLY SUMMARY                              1
    16        DELETE FINAL PLUME RISE CALC ON HRLY SUMMARY                 1
    17        DELETE AVG-PERIOD CONTRIBUTIONS                              0
    18        DELETE AVERAGING PERIOD SUMMARY                              0
    19        DELETE AVG CONCENTRATIONS AND HI-5 TABLES                    1
                    OTHER CONTROL AND OUTPUT OPTIONS
    20        RUN IS PART OF A SEGMENTED RUN                               0
    21        WRITE PARTIAL CONC TO DISK OR TAPE                           0
    22        WRITE HOURLY CONC TO DISK OR TAPE                            0
    23        WRITE AVG-PERIOD CONC TO DISK OR TAPE                        0
    24        PUNCH AVG-PERIOD CONC ONTO CARDS                             0

 ANEMOMETER HEIGHT=      10.00
 WIND PROFILE WITH HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS:
      FOR STABILITY A:  .07
          STABILITY B:  .07
          STABILITY C:  .10
          STABILITY D:  .15
          STABILITY E:  .35
          STABILITY F:  .55
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                                        POINT SOURCE INFORMATION

 SOURCE            EAST    NORTH    SO2(G/SEC)  PART(G/SEC)  STACK  STACK    STACK    STACK    POTEN. IMPACT  EFF     GRD-LVL  BUOY FLUX
                   COORD   COORD    EMISSIONS   EMISSIONS    HT(M)  TEMP(K)  DIAM(M)VEL(M/SEC)(MICRO G/M**3) HT(M)    ELEV        F
                  (USER UNITS)                                                                                       USER HT  M**4/S**3
                                                                                                                      UNITS

  1  1              .50     .70        .00        600.00     200.0   430.0    5.8     21.0        76.67       769.85    .00     551.78
  2  2              .40    1.85        .00        225.00     150.0   425.0    5.2     19.0        43.26       613.59    .00     391.19
  3  3              .50    1.80        .00        250.00     150.0   425.0    5.2     19.0        48.07       613.59    .00     391.19
  4  4             1.75     .85        .00         70.00      80.0   430.0    3.6     16.0        36.48       353.12    .00     161.96
  5  5             1.75     .75        .00         70.00      80.0   430.0    3.6     16.0        36.48       353.12    .00     161.96
  6  6             1.75     .65        .00         70.00      80.0   430.0    3.6     16.0        36.48       353.12    .00     161.96
  7  7             2.40    1.50        .00        100.00     120.0   415.0    5.0     23.0        20.03       599.90    .00     414.40
  8  8             2.50    1.60        .00        120.00     120.0   415.0    5.0     23.0        24.03       599.90    .00     414.40
  9  9             2.50    1.50        .00        100.00     120.0   415.0    5.0     23.0        20.03       599.90    .00     414.40
 10 10             1.80    1.85        .00         85.00      90.0   420.0    4.6     17.0        27.65       458.36    .00     266.66
 11 11             1.95    1.90        .00         85.00      90.0   420.0    4.6     17.0        27.65       458.36    .00     266.66
 12 12             2.10    1.85        .00         85.00      90.0   420.0    4.6     17.0        27.65       458.36    .00     266.66
 13 13             2.00    1.75        .00         60.00      50.0   440.0    3.0     15.0        51.77       267.21    .00     110.57
 14 14             1.90    1.75        .00         60.00      50.0   440.0    3.0     15.0        51.77       267.21    .00     110.57
 15 15             2.35    1.10        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 16 16             2.40    1.10        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 17 17             2.45    1.10        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 18 18             2.50    1.10        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 19 19             2.35    1.00        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 20 20             2.40    1.00        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 21 21             2.45    1.00        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 22 22             2.50    1.00        .00          5.00      30.0   450.0    2.7     12.0         9.51       172.85    .00      54.30
 23 23              .85    1.05        .00         80.00     120.0   420.0    4.8     18.0        20.64       521.19    .00     307.43
 24 24              .90    1.05        .00         80.00     120.0   420.0    4.8     18.0        20.64       521.19    .00     307.43
 25 25              .95    1.05        .00         80.00     120.0   420.0    4.8     18.0        20.64       521.19    .00     307.43
 26 26             1.00    1.05        .00         80.00     120.0   420.0    4.8     18.0        20.64       521.19    .00     307.43
 27 27              .70    2.65        .00         60.00     100.0   460.0    4.0     20.0        17.74       483.20    .00     288.80
 28 28              .70    2.60        .00         60.00     100.0   460.0    4.0     20.0        17.74       483.20    .00     288.80
 29 29              .70    2.55        .00         60.00     100.0   460.0    4.0     20.0        17.74       483.20    .00     288.80
 30 30              .70    2.50        .00         60.00     100.0   460.0    4.0     20.0        17.74       483.20    .00     288.80

SIGNIFICANT PART POINT SOURCES

      RANK           CHI-MAX      SOURCE NO.
               (MICROGRAMS/M**3)

        1              76.67          1
        2              51.77         13
        3              51.77         14
        4              48.07          3
        5              43.26          2
        6              36.48          4
        7              36.48          5
        8              36.48          6
        9              27.65         10
       10              27.65         11
HEIGHT ABOVE 100M FOR POINT SOURCE   1     HEIGHT =200.00 (METERS)    EMISSIONS=   600.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   2     HEIGHT =150.00 (METERS)    EMISSIONS=   225.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   3     HEIGHT =150.00 (METERS)    EMISSIONS=   250.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   7     HEIGHT =120.00 (METERS)    EMISSIONS=   100.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE    8    HEIGHT=120.00 (METERS)   EMISSIONS=   120.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE    9    HEIGHT=120.00 (METERS)   EMISSIONS=   120.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   23    HEIGHT=120.00 (METERS)   EMISSIONS=    80.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   24    HEIGHT=120.00 (METERS)   EMISSIONS=    80.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   25    HEIGHT=120.00 (METERS)   EMISSIONS=    80.00 (G/SEC)
HEIGHT ABOVE 100M FOR POINT SOURCE   26    HEIGHT=120.00 (METERS)   EMISSIONS=    80.00 (G/SEC)

    TOTAL PART EMISSION AND CUMULATIVE FRACTION ACCORDING TO HEIGHT

           TOTAL POINT   CUMULATIVE
HEIGHT(M) EMISSIONS(G/S)  FRACTION

  0 -  5       .00         .000
  6 - 10       .00         .000
 11 - 15       .00         .000
 16 - 20       .00         .000
 21 - 25       .00         .000
 26 - 30     40.00         .016
 31 - 35       .00         .016
 36 - 40       .00         .016
 41 - 45       .00         .016
 46 - 50    120.00         .062
 51 - 55       .00         .062
 56 - 60       .00         .062
 61 - 65       .00         .062
 66 - 70       .00         .062
 71 - 75       .00         .062
 76 - 80    210.00         .143
 81 - 85       .00         .143
 86 - 90    255.00         .242
 91 - 95       .00         .242
 96 -100    240.00         .335

TOTAL     2580.00

                    ADDITIONAL INFORMATION ON SOURCES.

  USER SPECIFIED   2 (NPT) SIGNIFICANT POINT SOURCES AS LISTED BY POINT SOURCE NUMBER:
     8   27

 EMISSION INFORMATION FOR   30 (NPT) POINT SOURCES HAS BEEN INPUT
 10 SIGNIFICANT POINT SOURCES(NSIGP) ARE TO BE USED FOR THIS RUN
 THE ORDER OF SIGNIFICANCE(IMPS) FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT SOURCE NUMBER:
     8   27    1   17   18    3    2    4    5    6

                    RECEPTOR INFORMATION

 MPTER INTERNALLY GENERATES 36 RECEPTORS ON A CIRCLE CORRESPONDING TO EACH NON-ZERO RADIAL DISTANCE FROM A CENTER POINT
        COORDINATES ARE (USER UNITS): (   2.000,   1.000)
        RADIAL DISTANCE(S) USER SPECIFIED (USER UNITS):       1.000          .000          .000          .000          .000

 RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPTOR HT       RECEPTOR GROUND LEVEL
                             COORD     COORD  ABV LOCAL GRD LVL          ELEVATION
                             (USER UNITS)          (METERS)          (USER HT UNITS)

    1           10, 1.0      2.174     1.985         .0                   .0
    2           20, 1.0      2.342     1.940         .0                   .0
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```
   3        30, 1.0       2.500    1.866       .0                  .0
   4        40, 1.0       2.643    1.766       .0                  .0
   5        50, 1.0       2.766    1.643       .0                  .0
   6        60, 1.0       2.866    1.500       .0                  .0
   7        70, 1.0       2.940    1.342       .0                  .0
   8        80, 1.0       2.985    1.174       .0                  .0
   9        90, 1.0       3.000    1.000       .0                  .0
  10       100, 1.0       2.985     .826       .0                  .0
  11       110, 1.0       2.940     .658       .0                  .0
  12       120, 1.0       2.866     .500       .0                  .0
  13       130, 1.0       2.766     .357       .0                  .0
  14       140, 1.0       2.643     .234       .0                  .0
  15       150, 1.0       2.500     .134       .0                  .0
  16       160, 1.0       2.342     .060       .0                  .0
  17       170, 1.0       2.174     .015       .0                  .0
  18       180, 1.0       2.000     .000       .0                  .0
  19       190, 1.0       1.826     .015       .0                  .0
  20       200, 1.0       1.658     .060       .0                  .0
  21       210, 1.0       1.500     .134       .0                  .0
  22       220, 1.0       1.357     .234       .0                  .0
  23       230, 1.0       1.234     .357       .0                  .0
  24       240, 1.0       1.134     .500       .0                  .0
  25       250, 1.0       1.060     .658       .0                  .0
  26       260, 1.0       1.015     .826       .0                  .0
  27       270, 1.0       1.000    1.000       .0                  .0
  28       280, 1.0       1.015    1.174       .0                  .0
  29       290, 1.0       1.060    1.342       .0                  .0
  30       300, 1.0       1.134    1.500       .0                  .0
  31       310, 1.0       1.234    1.643       .0                  .0
  32       320, 1.0       1.357    1.766       .0                  .0
  33       330, 1.0       1.500    1.866       .0                  .0
  34       340, 1.0       1.658    1.940       .0                  .0
  35       350, 1.0       1.826    1.985       .0                  .0
  36       360, 1.0       2.000    2.000       .0                  .0
  37         1            1.000    2.500       .0                  .0
  38         2            1.250    2.400       .0                  .0
  39         3            1.000    2.250       .0                  .0
  40         4            1.250    2.250       .0                  .0
  41         5            1.200    2.000       .0                  .0
  42         6            1.500    2.000       .0                  .0
  43         7             .750    1.700       .0                  .0
  44         8            1.000    1.620       .0                  .0
  45         9             .750    1.500       .0                  .0
  46        10            1.000    1.500       .0                  .0
  47        11             .950    1.250       .0                  .0
  48        12            1.250    1.250       .0                  .0
  49        13            2.000    1.300       .0                  .0
  50        14            2.250    1.250       .0                  .0
  51        15            3.000    1.750       .0                  .0
  52        16            3.000    1.500       .0                  .0
  53        17            3.250    1.500       .0                  .0
  54        18            3.500    1.500       .0                  .0
  55        19            3.500    1.250       .0                  .0
  56        20            3.000    1.000       .0                  .0
  57        21            3.500    1.000       .0                  .0
  58        22            2.500     .750       .0                  .0
  59        23            2.750     .750       .0                  .0
  60          24          3.000     .750     .0          .0
  61          25          3.250     .750     .0          .0
  62          26          1.250     .500     .0          .0
  63          27          1.500     .500     .0          .0
  64          28          1.750     .500     .0          .0
  65          29          2.000     .500     .0          .0
  66          30          2.250     .500     .0          .0
  67          31          2.500     .500     .0          .0
  68          32          3.000     .500     .0          .0
  69          33          3.500     .500     .0          .0
  70          34           .750     .250     .0          .0
  71          35          2.250     .250     .0          .0
  72          36          2.750     .250     .0          .0
  73          37           .500     .000     .0          .0
  74          38           .750     .000     .0          .0
  75          39          1.000     .000     .0          .0
  76          40          1.250     .000     .0          .0
  77          41          1.500     .000     .0          .0
  78          42          1.750     .000     .0          .0
  79          43          2.000     .000     .0          .0
  80          44          2.250     .000     .0          .0
  81          45          2.500     .000     .0          .0
  82          46          2.750     .000     .0          .0
  83          47          3.000     .000     .0          .0
  84          48          3.250     .000     .0          .0
  85          49          3.500     .000     .0          .0
  86          50          3.500    -.050     .0          .0
```

```
INPUT MET DATA  79 / 292
HOUR   THETA      SPEED   MIXING    TEMP      STABILITY
       (DEG)      (M/S)  HEIGHT(M) (DEG-K)    CLASS

 12   290.00       2.70  1800.00   298.00        2
 13   320.00       2.90  1850.00   299.00        2
 14   305.00       3.00  1900.00   299.00        2

RESULTANT MET CONDITIONS

 WIND DIRECTION= 305.35           RESULTANT WIND SPEED=    2.81
 AVERAGE WIND SPEED=    2.87      AVERAGE TEMP= 298.67
 WIND PERSISTENCE=  .978          MODAL STABILITY= 2
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EXAMPLE FOUR - APPLICATION FOR 10 SOURCES AND [illegible] RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE        20 FEBRUARY 1980

              PART CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 292 : HOUR 12

HOUR   THETA    SPEED  MIXING     TEMP   STABILITY
       (DEG)    (M/S) HEIGHT(M)   (K)     CLASS

 12   290.00    2.70  1800.00   298.00      4


                        1          2          3          4          5          6          7          8          9         10
FINAL HT (M)         792.06     564.30     564.30     336.57     336.57     336.57     556.98     556.98     556.98     472.59
FINAL HT (M)         472.59     472.50     261.20     261.20     173.85     173.85     173.45     173.85     173.45     173.85
FINAL HT (M)         173.85     173.85     885.68     885.68     885.68     885.68     855.85     455.85     855.85     455.85
DIST FIN HT (KM)        1.465      1.276      1.276       .897       .897       .897      1.304      1.304      1.304      1.094
DIST FIN HT (KM)        1.094      1.094       .771       .771       .583       .583       .583       .583       .583       .583
DIST FIN HT (KM)         .583       .583      1.158      1.158      1.158      1.158      1.127      1.127      1.127      1.127

  RANK      1          2          3          4          5          6          7          8          9         10      TOTAL      TOTAL
                                                                                                                    SIGNIF     ALL POINT
SOURCE #    4         27          1         13         14          3          2          4          5          6      POINT      SOURCES
RECEP #
   1      .000      9.589       .000       .000       .000       .188       .303       .000       .000       .000     10.081     40.047
   2      .000     12.324       .000       .000       .000       .356       .627       .000       .000       .000     13.306     51.273
   3      .000     14.174       .000       .023       .261       .073      1.029       .000       .000       .000     16.565     61.540
   4      .000     14.303       .000      1.290      1.474      2.832      3.260       .000       .000       .000     23.158     75.080
   5      .010     13.837       .000      8.183      9.442      5.968      7.051       .000       .000       .000     44.381    102.125
   6      .038     11.580       .000     24.718     28.572     12.508     13.758       .000       .000       .000     91.175    148.612
   7      .136      8.463       .002     33.505     41.283     22.832     23.430       .000       .000       .000    129.651    170.012
   8      .076      5.267       .023     22.285     31.691     38.970     30.195       .003       .020       .000    128.778    163.468
   9      .011      2.778       .175      7.510     17.323     40.325     41.777       .148       .021       .002    110.034    146.129
  10      .000      1.187       .898      1.236      2.969     46.048     42.582      2.212       .555       .095     97.733    157.996
  11      .000       .381      3.206       .089       .310     34.891     35.827     10.150      8.442      1.392     94.692    147.434
  12      .000       .098      9.234       .002       .714     26.520     24.701     18.726     13.197      6.917     98.413    159.732
  13      .000       .019     15.660       .000       .000     14.509     13.801     14.387     15.817     13.273     87.556    152.839
  14      .000       .003     22.598       .000       .000      6.338      6.384      4.201      7.894      9.925     56.897    107.509
  15      .000       .000     25.268       .010       .000      2.199      2.757       .806      1.152      2.669     34.047     62.430
  16      .000       .000     22.355       .000       .000       .607       .712       .039       .048       .221     23.951     35.450
  17      .000       .000     15.999       .000       .000       .135       .178       .000       .000       .002     16.313     19.697
  18      .000       .000      9.527       .000       .000       .025       .038       .000       .000       .000      9.589     10.322
  19      .000       .000      4.905       .000       .000       .004       .007       .000       .000       .000      4.916      5.039
  20      .000       .000      2.950       .000       .000       .001       .000       .000       .000       .000      2.961      2.978
  21      .000       .000      1.731       .000       .000       .000       .000       .000       .000       .000      1.731      1.738
  22      .000       .000       .955       .000       .000       .000       .000       .000       .010       .000       .955       .956
  23      .000       .000       .454       .000       .000       .000       .000       .000       .000       .000       .454       .454
  24      .000       .000       .135       .000       .000       .000       .000       .000       .000       .000       .135       .135
  25      .000       .000       .010       .000       .000       .000       .000       .000       .000       .000       .010       .010
  26      .000       .000       .000       .000       .000       .000       .000       .000       .000       .000       .000       .000
  27      .000       .000       .000       .000       .000       .000       .002       .000       .000       .000       .002       .002
  28      .000       .000       .000       .000       .000       .007       .028       .000       .000       .000       .035       .035
  29      .000       .000       .000       .000       .000       .124       .282       .000       .000       .000       .406       .406
  30      .000       .000       .000       .000       .000       .598      1.050       .000       .000       .000      1.648      1.648
  31      .000       .000       .000       .000       .000       .702      1.272       .000       .000       .000      1.974      1.975
 32    .000    .024    .003    .000    .000    .330    .725    .000    .000    .000   1.048   1.123
 33    .000    .119    .000    .000    .000    .135    .330    .000    .000    .000    .594   1.587
 34    .000    .860    .000    .000    .010    .271    .170    .000    .000    .000   1.110   5.679
 35    .000   3.022    .000    .000    .000    .058    .181    .000    .000    .000   3.221  15.050
 36    .000   6.265    .000    .000    .000    .074    .178    .000    .000    .000   6.520  27.570
 37    .000    .038    .000    .000    .000    .000    .000    .000    .000    .000    .034    .077
 38    .000    .666    .000    .000    .000    .000    .000    .000    .000    .000    .666   2.200
 39    .000    .001    .000    .000    .000    .000    .000    .000    .000    .000    .001    .029
 40    .000    .719    .000    .000    .000    .000    .000    .000    .000    .000    .719   2.036
 41    .000    .005    .000    .000    .000    .000    .004    .000    .000    .000    .012    .098
 42    .000    .427    .000    .000    .000    .010    .087    .000    .000    .000    .490   3.226
 43    .000    .000    .000    .000    .000    .000    .007    .000    .000    .000    .007    .007
 44    .000    .000    .000    .000    .000    .181    .390    .000    .000    .000    .540    .540
 45    .000    .000    .000    .000    .000    .000    .003    .000    .000    .000    .003    .003
 46    .000    .000    .000    .000    .000    .177    .358    .000    .000    .000    .491    .491
 47    .000    .000    .000    .000    .000    .008    .020    .000    .000    .000    .025    .025
 48    .000    .000    .000    .000    .000    .588    .884    .000    .000    .000   1.474   1.474
 49    .000    .005    .015    .000    .000  11.987  13.223    .000    .000    .000  25.230  37.460
 50    .000    .442    .001    .000    .009  22.180  23.828    .000    .000    .000  46.460  49.305
 51    .000  19.238    .000   2.840   3.187   2.928   3.639    .000    .000    .000  30.771  91.031
 52    .154  13.552    .000  29.461  10.892  12.203  13.265    .000    .000    .000  79.529 137.539
 53    .551  16.222    .000  30.753  28.810  11.273  12.088    .000    .000    .000  99.258 124.902
 54    .900  17.465    .001  25.427  23.297  10.108  10.663    .000    .000    .000  88.057 173.847
 55   2.740  12.815    .023  53.201  51.391  28.656  28.138    .006    .031    .000 168.957 274.587
 56    .011   2.728    .175   7.510  13.323  44.329  41.777    .164    .021    .002 110.034 196.129
 57   1.821   7.288    .287  40.211  44.437  41.959  38.687    .356    .082    .015 174.743 268.382
 58    .000    .056   1.041    .000    .000  24.770  24.086   2.714    .731    .081  53.449  77.750
 59    .000    .265   1.397    .017    .083  36.009  33.886   3.669   1.072    .194  76.676 109.350
 60    .000    .817   1.600    .400   1.590  44.709  41.111   5.041   1.673    .791  97.639 161.509
 61    .033   1.345   1.005   4.456   7.861  49.890  44.090   5.819   2.005    .569 118.771 224.137
 62    .000    .000    .351    .000    .000    .000    .000    .000    .000    .000    .351    .352
 63    .000    .000   1.151    .000    .000    .009    .018    .000    .000    .000   1.177   1.508
 64    .000    .000   2.090    .000    .000    .173    .258    .000    .000    .000   2.520   6.082
 65    .000    .000   2.917    .000    .000   1.270   1.580    .001    .019    .080   5.837  17.540
 66    .000    .001   4.690    .000    .000   4.850   5.214   1.151   2.102   2.028  20.119  48.319
 67    .000    .007   6.417    .000    .000  11.222  11.840   6.215   6.412   4.158  46.072  72.836
 68    .000    .198   9.416    .008    .065  31.048  30.780  22.184  18.928   7.774 115.068 190.995
 69    .051   1.251   9.880   2.727   4.412  46.406  41.518  22.192  13.938   7.441 148.800 247.669
 70    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000
 71    .000    .000  13.580    .000    .000   1.195   1.377    .031    .171    .678  16.001  18.228
 72    .000    .017  23.049    .000    .010   9.421   9.182   9.229  13.283  15.102  79.278 140.226
 73    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000
 74    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000    .000
 75    .000    .000    .001    .000    .000    .000    .000    .000    .000    .000    .001    .001
 76    .000    .000    .101    .000    .000    .000    .000    .000    .000    .000    .101    .101
 77    .000    .000   1.053    .000    .000    .000    .000    .000    .000    .000   1.053   1.053
 78    .000    .000   3.610    .000    .000    .001    .000    .000    .000    .000   3.613   3.649
 79    .000    .000   9.527    .000    .000    .025    .038    .000    .000    .000   9.590  10.322
 80    .000    .000  10.230    .000    .000    .215    .271    .000    .003    .012  10.729  28.759
 81    .000    .000  29.277    .000    .000   1.016   1.128    .074    .272    .829  33.556  50.590
 82    .000    .001  39.814    .000    .000   3.117   3.180   1.609   3.673   7.112  58.507  78.951
 83    .000    .037  45.275    .000    .000   7.012   6.768   8.278  13.895  20.254 102.842 159.118
 84    .000    .333  49.127    .001    .005  12.589  11.696  19.589  24.764  32.787 152.197 227.016
 85    .000    .110  49.010    .020    .074  19.135  17.352  30.014  35.536  37.902 189.162 275.203
 86    .000    .084  53.763    .017    .046  16.720  15.530  36.600  33.069  37.205 192.[illegible] [illegible].282
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EXAMPLE FOUR - APPLICATION FOR 70 SOURCES AND 90 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE       29 FEBRUARY 1980

          PART SUMMARY CONCENTRATION TABLE(MICROGRAMS/M**3)        79/ 292 : HOUR 12

    RECEPTOR          EAST      NORTH     RECEPTOR HT       RECEPTOR          TOTAL FROM      TOTAL FROM    CONCENTRATION
    NO. NAME          COORD     COORD     ABV GRD (M)    GRD-LVL ELEV      SIGNIF POINT     ALL SOURCES        RANK
                                                         (USER HT UNITS)       SOURCES

     1     10, 1.0     2.17      1.98        .0                 .0           10.3804         40.0473             38
     2     20, 1.0     2.34      1.94        .0                 .0           13.3068         51.2729             34
     3     30, 1.0     2.50      1.87        .0                 .0           16.5689         61.5801             33
     4     40, 1.0     2.64      1.77        .0                 .0           23.1581         75.0797             31
     5     50, 1.0     2.77      1.64        .0                 .0           44.3412        102.1247             26
     6     60, 1.0     2.87      1.50        .0                 .0           91.1752        148.6122             19
     7     70, 1.0     2.94      1.34        .0                 .0          129.6508        179.0116             11
     8     80, 1.0     2.98      1.17        .0                 .0          128.3781        163.4676             13
     9     90, 1.0     3.00      1.00        .0                 .0          110.0742        146.1265             22
    10    100, 1.0     2.98       .83        .0                 .0           97.7330        157.9959             17
    11    110, 1.0     2.94       .66        .0                 .0           94.6919        147.8739             20
    12    120, 1.0     2.87       .50        .0                 .0           98.4128        159.7715             16
    13    130, 1.0     2.77       .36        .0                 .0           87.5560        152.8386             18
    14    140, 1.0     2.64       .23        .0                 .0           56.8071        107.5086             25
    15    150, 1.0     2.50       .13        .0                 .0           34.0475         62.4296             32
    16    160, 1.0     2.34       .06        .0                 .0           23.0508         35.4591             39
    17    170, 1.0     2.17       .02        .0                 .0           16.3135         19.6969             44
    18    180, 1.0     2.00       .00        .0                 .0            9.5891         10.3217             47
    19    190, 1.0     1.83       .02        .0                 .0            4.9167          5.0387             51
    20    200, 1.0     1.66       .06        .0                 .0            2.9605          2.9781             54
    21    210, 1.0     1.50       .13        .0                 .0            1.7315          1.7336             58
    22    220, 1.0     1.36       .23        .0                 .0             .9554           .9556             65
    23    230, 1.0     1.23       .36        .0                 .0             .8545           .8545             68
    24    240, 1.0     1.13       .50        .0                 .0             .1347           .1348             71
    25    250, 1.0     1.06       .66        .0                 .0             .0105           .0105             78
    26    260, 1.0     1.02       .83        .0                 .0             .0002           .0002             83
    27    270, 1.0     1.00      1.00        .0                 .0             .0021           .0021             81
    28    280, 1.0     1.02      1.17        .0                 .0             .0348           .0348             75
    29    290, 1.0     1.06      1.34        .0                 .0             .4067           .4067             69
    30    300, 1.0     1.13      1.50        .0                 .0            1.6478          1.6478             59
    31    310, 1.0     1.23      1.64        .0                 .0            1.9743          1.9747             57
    32    320, 1.0     1.36      1.77        .0                 .0            1.0680          1.1270             63
    33    330, 1.0     1.50      1.87        .0                 .0             .5963          1.5878             60
    34    340, 1.0     1.66      1.94        .0                 .0            1.1107          5.6791             50
    35    350, 1.0     1.83      1.98        .0                 .0            3.2214         15.0507             46
    36    360, 1.0     2.00      2.00        .0                 .0            6.5200         27.5793             41
    37     1           1.00      2.50        .0                 .0             .0335           .0778             74
    38     2           1.25      2.50        .0                 .0             .6668          2.1996             55
    39     3           1.00      2.25        .0                 .0             .0011           .0292             76
    40     4           1.25      2.25        .0                 .0             .3193          2.0355             56
    41     5           1.00      2.00        .0                 .0             .0118           .0985             73
    42     6           1.50      2.00        .0                 .0             .4797          3.2262             53
    43     7            .75      1.75        .0                 .0             .0072           .0072             79
    44     8           1.00      1.60        .0                 .0             .5405           .5405             66
    45     9            .75      1.50        .0                 .0             .0030           .0030             80
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 46   10        1.00    1.50       .0             .0       .4909      .4909          67
 47   11         .95    1.25       .0             .0       .0245      .0245          77
 48   12        1.25    1.25       .0             .0      1.4739     1.4739          62
 49   13        2.00    1.00       .0             .0     25.2295    27.4600          42
 50   14        2.25    1.25       .0             .0     46.4590    49.3053          36
 51   15        3.00    1.75       .0             .0     30.7713    91.9312          29
 52   16        3.00    1.50       .0             .0     99.5298   167.5389          12
 53   17        3.25    1.50       .0             .0     99.2577   184.9020           8
 54   18        3.50    1.50       .0             .0     98.0564   183.8471           9
 55   19        3.50    1.25       .0             .0    168.9572   276.5873           1
 56   20        3.00    1.00       .0             .0    110.0342   146.1285          21
 57   21        3.50    1.00       .0             .0    174.7420   264.3818           5
 58   22        2.50     .75       .0             .0     53.4485    77.7505          30
 59   23        2.75     .75       .0             .0     76.6756   109.3585          24
 60   24        3.00     .75       .0             .0     97.6391   161.5089          14
 61   25        3.25     .75       .0             .0    118.7705   224.1334           7
 62   26        1.25     .50       .0             .0       .3512      .3524          70
 63   27        1.50     .50       .0             .0      1.1775     1.5076          61
 64   28        1.75     .50       .0             .0      2.5202     6.0824          49
 65   29        2.00     .50       .0             .0      5.8365    17.5405          45
 66   30        2.25     .50       .0             .0     20.1191    48.3187          37
 67   31        2.50     .50       .0             .0     46.9719    92.8356          28
 68   32        3.00     .50       .0             .0    115.0676   180.9947          10
 69   33        3.50     .50       .0             .0    148.9005   267.6689           3
 70   34         .75     .25       .0             .0       .0000      .0000          84
 71   35        2.25     .25       .0             .0     16.9915    34.2240          40
 72   36        2.75     .25       .0             .0     79.2785   140.2261          23
 73   37         .50     .00       .0             .0       .0000      .0000          86
 74   38         .75     .00       .0             .0       .0000      .0000          85
 75   39        1.00     .00       .0             .0       .0007      .0007          82
 76   40        1.25     .00       .0             .0       .1012      .1012          72
 77   41        1.50     .00       .0             .0      1.0528     1.0530          64
 78   42        1.75     .00       .0             .0      3.6137     3.6490          52
 79   43        2.00     .00       .0             .0      9.5891    10.3217          48
 80   44        2.25     .00       .0             .0     19.7294    24.7590          43
 81   45        2.50     .00       .0             .0     33.5563    50.5905          35
 82   46        2.75     .00       .0             .0     58.5073    94.9515          27
 83   47        3.00     .00       .0             .0    132.4418   160.1183          15
 84   48        3.25     .00       .0             .0    152.1969   227.0162           6
 85   49        3.50     .00       .0             .0    189.1618   275.2028           2
 86   50        3.50    -.05       .0             .0    182.7415   265.0416           4
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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 50 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE         20 FEBRUARY 1980

                    PART CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/ 292 : HOUR 13

HOUR   THETA     SPEED   MIXING    TEMP    STABILITY
       (DEG)     (M/S) HEIGHT(M)    (K)      CLASS

 13   320.00      2.90  1850.00   289.00       3

                          1          2          3          4          5          6          7          8          9          10
FINAL HT (M)           665.71     535.88     535.88     317.79     317.79     317.79     524.75     524.75     524.75     407.39
FINAL HT (M)           497.39     407.39     245.80     245.80     162.89     162.89     162.89     162.89     162.89     162.89
FINAL HT (M)           162.89     162.89     458.78     458.78     458.78     458.78     430.08     430.08     430.08     430.08
DIST FIN HT (KM)          1.460      1.272      1.272       .898       .898       .898      1.299      1.299      1.299      1.090
DIST FIN HT (KM)          1.090      1.090       .769       .769       .581       .581       .581       .581       .581       .581
DIST FIN HT (KM)           .581       .581      1.158      1.158      1.158      1.158      1.125      1.125      1.125      1.125

   RANK       1          2          3          4          5          6          7          8          9          10         TOTAL      TOTAL
                                                                                                                        SIGNIF     ALL POINT
                                                                                                                        POINT      SOURCES

SOURCE #      8          27         1          13         14         3          2          4          5          6
RECEP #
  1          .000       .115       .000       .000       .000       .000       .000       .000       .000       .000        .115       .211
  2          .000       .079       .000       .000       .000       .000       .000       .000       .000       .000        .079       .148
  3          .000       .081       .000       .000       .000       .000       .000       .000       .000       .000        .081       .158
  4          .000       .116       .000       .000       .000       .000       .000       .000       .000       .000        .116       .239
  5          .000       .207       .000       .000       .000       .000       .000       .000       .000       .000        .207       .475
  6          .000       .423       .000       .013       .004       .000       .000       .000       .000       .000        .440      1.291
  7          .037       .907       .000       .380       .160       .000       .000       .000       .000       .000       1.484      4.681
  8          .509      1.914       .000      3.846      1.944       .000       .001       .000       .000       .000       8.214     19.108
  9         1.470      3.787       .000     17.190     10.563       .006       .006       .000       .000       .000      33.030     64.175
 10         1.724      6.782       .000     40.588     30.468       .050       .047       .000       .000       .000      79.659    142.324
 11         1.013     10.778       .000     55.768     51.634       .310       .275       .000       .000       .000     119.778    228.459
 12          .310     14.815       .000     46.710     54.102      1.787      1.182       .011       .001       .000     118.527    264.729
 13          .047     17.606       .000     23.566     35.496      4.597      3.838       .442       .066       .005      85.968    193.000
 14          .003     17.923       .000      7.176     14.281     11.553      9.606      4.272      1.323       .261      66.398    137.607
 15          .000     15.598       .003      1.175      3.331     22.593     18.911     12.984      6.773      2.671      83.801    142.152
 16          .000     11.588       .022       .092       .408     34.679     29.865     13.131     10.384      7.626     107.755    160.470
 17          .000      7.389       .088       .003       .022     43.093     38.548      4.230      5.249      6.024     104.647    155.809
 18          .000      4.074       .216       .000       .000     43.998     41.457       .380       .591       .879      91.596    139.432
 19          .000      1.970       .361       .000       .000     37.660     37.926       .004       .005       .007      77.932    115.141
 20          .000       .858       .421       .000       .000     27.658     30.227       .000       .000       .000      59.160     81.208
 21          .000       .343       .313       .000       .000     17.938     21.597       .000       .000       .000      40.191     51.262
 22          .000       .135       .126       .000       .000     10.661     14.322       .000       .000       .000      25.243     30.288
 23          .000       .055       .018       .000       .000      6.085      9.185       .000       .000       .000      15.343     17.141
 24          .000       .026       .000       .000       .000      3.526      5.950       .000       .000       .000       9.502     10.001
 25          .000       .016       .000       .000       .000      2.331      4.031       .000       .000       .000       6.378      6.498
 26          .000       .014       .000       .000       .000      2.143      3.403       .000       .000       .000       5.557      5.616
 27          .000       .019       .000       .000       .000      2.061      3.179       .000       .000       .000       5.259      5.339
 28          .000       .044       .000       .000       .000      1.571      2.243       .000       .000       .000       3.858      4.039
 29          .000       .148       .000       .000       .000       .512       .716       .000       .000       .000       1.377      1.970
 30          .000       .582       .000       .000       .000       .028       .052       .000       .000       .000        .662      2.951
 31          .000      1.912       .000       .000       .000       .000       .001       .000       .000       .000       1.912      8.797
 32     .000     3.763    .000     .000     .000     .000     .000     .000     .000     .000     3.763    14.259
 33     .000     3.475    .000     .000     .000     .000     .000     .000     .000     .000     3.475    10.437
 34     .000     1.769    .000     .000     .000     .000     .000     .000     .000     .000     1.769     4.164
 35     .000      .657    .000     .000     .000     .000     .000     .000     .000     .000      .657     1.328
 36     .000      .242    .000     .000     .000     .000     .000     .000     .000     .000      .242      .456
 37     .000      .003    .000     .000     .000     .000     .000     .000     .000     .000      .003      .003
 38     .000      .029    .000     .000     .000     .000     .000     .000     .000     .000      .029      .035
 39     .000      .364    .000     .000     .000     .000     .000     .000     .000     .000      .364      .820
 40     .000      .496    .000     .000     .000     .000     .000     .000     .000     .000      .496      .865
 41     .000     2.154    .000     .000     .000     .000     .000     .000     .000     .000     2.154     7.071
 42     .000     1.917    .000     .000     .000     .000     .000     .000     .000     .000     1.917     4.725
 43     .000      .001    .000     .000     .000     .000     .000     .000     .000     .000      .001      .002
 44     .000      .141    .000     .000     .000     .002     .007     .000     .000     .000      .150      .764
 45     .000      .000    .000     .000     .000     .009     .062     .000     .000     .000      .071      .072
 46     .000      .098    .000     .000     .000     .040     .086     .000     .000     .000      .223      .652
 47     .000      .018    .000     .000     .000     .833    1.394     .000     .000     .000     2.245     2.320
 48     .000     1.084    .000     .000     .000    1.007    1.103     .000     .000     .000     3.194     7.324
 49     .000    17.622    .000     .000     .032     .781     .763     .000     .000     .000    19.198    71.375
 50     .000    11.548    .000    5.684   14.076     .008     .009     .000     .000     .000    31.325    61.794
 51     .000      .021    .000     .000     .000     .000     .000     .000     .000     .000      .021      .041
 52     .000      .231    .000     .003     .001     .000     .000     .000     .000     .000      .235      .641
 53     .000      .072    .000     .000     .000     .000     .000     .000     .000     .000      .073      .179
 54     .000      .022    .000     .000     .000     .000     .000     .000     .000     .000      .022      .051
 55     .018      .167    .000     .021     .005     .000     .000     .000     .000     .000      .211      .707
 56    1.470     3.787    .000   17.199   10.563     .006     .006     .000     .000     .000    33.031    64.175
 57     .573      .731    .000     .941     .486     .000     .000     .000     .000     .000     2.731     8.324
 58     .000    17.666    .000   15.046   29.506     .905     .882     .000     .000     .000    64.005   129.085
 59     .114    12.864    .000   49.297   54.090     .319     .287     .000     .000     .000   116.971   211.027
 60    1.812     7.901    .000   47.387   37.831     .192     .003     .000     .000     .000    95.126   173.010
 61    3.829     4.288    .000   23.242   15.583     .032     .030     .000     .000     .000    47.004   101.219
 62     .000      .106    .000     .000     .000    3.423   10.669     .000     .000     .000    14.198    20.347
 63     .000     1.029    .000     .000     .000   18.542   20.905     .000     .000     .000    40.476    49.261
 64     .000     4.481    .000     .000     .000   23.391   22.825     .000     .000     .000    50.697    70.247
 65     .000    10.821    .000     .000     .003   18.628   16.755    1.032     .390     .024    47.653    86.210
 66     .000    16.882    .000     .139     .849   10.890    9.396    1.342     .171     .004    39.673    95.081
 67     .000    19.011    .000    5.885   14.009    5.180    4.390     .233     .018     .000    48.694   115.026
 68    1.190    12.303    .000   55.256   54.689     .820     .708     .004     .000     .000   124.970   279.724
 69    7.896     4.536    .000   24.174   17.301     .105     .093     .000     .000     .000    54.104   128.792
 70     .000      .000    .007     .000     .000     .019     .077     .000     .000     .000      .103      .103
 71     .000    12.778    .002     .041     .254   26.148   22.584    7.731    5.515    2.537    77.592   125.547
 72     .025    17.882    .000   15.710   25.598    8.001    6.634    2.162     .551     .088    76.651   167.576
 73     .000      .000    .000     .000     .000     .000     .000     .000     .000     .000      .000      .000
 74     .000      .000    .035     .000     .000     .010     .040     .000     .000     .000      .085      .085
 75     .000      .001    .736     .000     .000     .365     .837     .000     .000     .000     1.939     1.950
 76     .000      .021   1.573     .000     .000    3.736    5.910     .000     .000     .000    11.240    12.206
 77     .000      .229   1.202     .000     .000   15.347   18.975     .000     .000     .000    35.776    45.607
 78     .000     1.259    .563     .000     .000   32.907   34.499     .000     .000     .000    69.228   100.761
 79     .000     4.074    .216     .000     .000   43.998   41.457     .380     .591     .879    91.596   139.432
 80     .000     8.735    .077     .013     .080   41.810   36.822    8.105    8.008    8.208   111.858   165.272
 81     .000    13.592    .025     .650    1.913   30.996   26.215   20.750   15.035    8.695   117.871   176.184
 82     .012    16.457    .007    6.562   12.065   19.197   15.877   15.913    8.790    3.714    98.594   171.407
 83     .380    16.359    .002   23.226   31.122   10.423    8.549    6.423    2.786     .935   100.205   227.723
 84    3.188    13.920    .001   40.472   43.686    5.156    4.227    1.855     .669     .187   113.357   304.138
 85   10.553    10.876    .000   43.396   40.337    2.387    1.969     .045     .182     .035   109.780   300.170
 86   10.101    10.967    .000   42.303   40.581    2.987    2.655     .752     .261     .073   110      [illegible]5.487
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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 90 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE        20 FEBRUARY 1980

                    PART SUMMARY CONCENTRATION TABLE(MICROGRAMS/M**3)        79/ 292 : HOUR 13

 RECEPTOR           EAST      NORTH     RECEPTOR HT      RECEPTOR        TOTAL FROM      TOTAL FROM   CONCENTRATION
 NO. NAME           COORD     COORD     ABV GRD (M)    GRD-LVL ELEV    SIGNIF POINT    ALL SOURCES       RANK
                                                      (USER HT UNITS)     SOURCES

   1   10. 1.0      2.17      1.98         .0              .0              .1186          .2110            74
   2   20. 1.0      2.34      1.94         .0              .0              .0794          .1981            77
   3   30. 1.0      2.50      1.87         .0              .0              .0814          .1561            76
   4   40. 1.0      2.64      1.77         .0              .0              .1157          .2387            73
   5   50. 1.0      2.77      1.64         .0              .0              .2070          .4747            71
   6   60. 1.0      2.87      1.50         .0              .0              .8390         1.2913            68
   7   70. 1.0      2.94      1.34         .0              .0             1.4838         4.6806            56
   8   80. 1.0      2.98      1.17         .0              .0             8.2135        19.1083            42
   9   90. 1.0      3.00      1.00         .0              .0            33.0305        64.1751            35
  10  100. 1.0      2.98       .87         .0              .0            79.6593       142.3243            17
  11  110. 1.0      2.94       .66         .0              .0           119.3781       228.4589             6
  12  120. 1.0      2.87       .50         .0              .0           118.5272       264.7293             5
  13  130. 1.0      2.77       .36         .0              .0            85.9684       192.9996             9
  14  140. 1.0      2.64       .23         .0              .0            66.3976       137.6078            21
  15  150. 1.0      2.50       .17         .0              .0            83.8010       142.1519            18
  16  160. 1.0      2.34       .06         .0              .0           107.7552       160.4697            15
  17  170. 1.0      2.17       .02         .0              .0           108.6866       155.8089            16
  18  180. 1.0      2.00       .00         .0              .0            91.5958       139.4317            19
  19  190. 1.0      1.83       .02         .0              .0            77.9317       115.1406            25
  20  200. 1.0      1.66       .06         .0              .0            59.1507        81.2079            31
  21  210. 1.0      1.50       .17         .0              .0            40.1909        51.2628            37
  22  220. 1.0      1.36       .23         .0              .0            25.2832        30.2881            40
  23  230. 1.0      1.23       .36         .0              .0            15.3426        17.1414            43
  24  240. 1.0      1.17       .50         .0              .0             9.5028        10.0013            47
  25  250. 1.0      1.06       .66         .0              .0             6.3783         6.4976            52
  26  260. 1.0      1.02       .87         .0              .0             5.5565         5.6161            53
  27  270. 1.0      1.00      1.00         .0              .0             5.2585         5.3392            54
  28  280. 1.0      1.02      1.17         .0              .0             3.8578         4.0395            58
  29  290. 1.0      1.06      1.34         .0              .0             1.3765         1.9695            61
  30  300. 1.0      1.13      1.50         .0              .0              .4623         2.9508            59
  31  310. 1.0      1.23      1.64         .0              .0             1.9125         8.7967            48
  32  320. 1.0      1.36      1.77         .0              .0             3.7632        14.2580            44
  33  330. 1.0      1.50      1.87         .0              .0             3.4787        10.4367            46
  34  340. 1.0      1.66      1.94         .0              .0             1.7689         4.1638            57
  35  350. 1.0      1.83      1.98         .0              .0              .4567         1.3278            63
  36  360. 1.0      2.00      2.00         .0              .0              .2419          .4561            72
  37   1            1.00      2.50         .0              .0              .0028          .0030            88
  38   2            1.25      2.40         .0              .0              .0285          .0351            83
  39   3            1.00      2.25         .0              .0              .3609          .8204            66
  40   4            1.25      2.25         .0              .0              .4963          .8653            65
  41   5            1.20      2.00         .0              .0             2.1539         7.0710            51
  42   6            1.50      2.00         .0              .0             1.9165         4.7247            55
  43   7             .75      1.70         .0              .0              .0006          .0022            85
  44   8            1.00      1.60         .0              .0              .1504          .7639            67
  45   9             .75      1.50         .0              .0              .0707          .0719            80
 46   10     1.00   1.50    .5     .0      .2232      .6518    69
 47   11      .95   1.25    .5     .0     2.2449     2.3196    60
 48   12     1.25   1.25    .5     .0     3.1937     7.3238    50
 49   13     2.00   1.00    .5     .0    19.1983    71.3787    32
 50   14     2.25   1.25    .5     .0    31.3249    61.7943    36
 51   15     3.00   1.75    .5     .0      .0207      .0812    82
 52   16     3.00   1.50    .5     .0      .2352      .6413    70
 53   17     3.25   1.50    .5     .0      .0728      .1789    75
 54   18     3.50   1.50    .5     .0      .0223      .0515    81
 55   19     3.50   1.25    .5     .0      .2110      .7078    68
 56   20     3.00   1.00    .5     .0    33.0305    64.1752    34
 57   21     3.50   1.00    .5     .0     2.7310     8.3238    49
 58   22     2.50    .75    .5     .0    64.0052   129.0852    22
 59   23     2.75    .75    .5     .0   116.9711   211.0275     8
 60   24     3.00    .75    .5     .0    95.1263   173.0100    11
 61   25     3.25    .75    .5     .0    97.0038   101.2191    27
 62   26     1.25    .50    .5     .0    18.1985    20.3467    41
 63   27     1.50    .50    .5     .0    40.4762    49.2608    38
 64   28     1.75    .50    .5     .0    50.4968    70.2466    33
 65   29     2.00    .50    .5     .0    47.6532    86.2105    30
 66   30     2.25    .50    .5     .0    39.6732    95.0807    29
 67   31     2.50    .50    .5     .0    48.6939   115.0257    26
 68   32     3.00    .50    .5     .0   124.9700   279.7236     4
 69   33     3.50    .50    .5     .0    58.1037   128.7917    23
 70   34      .75    .25    .5     .0      .1030      .1030    78
 71   35     2.25    .25    .5     .0    77.5922   125.5966    24
 72   36     2.75    .25    .5     .0    76.6508   167.5761    13
 73   37      .50    .00    .5     .0      .0008      .0008    86
 74   38      .75    .00    .5     .0      .0846      .0846    79
 75   39     1.00    .00    .5     .0     1.9394     1.9500    62
 76   40     1.25    .00    .5     .0    11.2399    12.2057    45
 77   41     1.50    .00    .5     .0    35.7761    45.6033    39
 78   42     1.75    .00    .5     .0    69.2281   100.7611    28
 79   43     2.00    .00    .5     .0    91.5958   139.4317    20
 80   44     2.25    .00    .5     .0   111.8585   165.2719    14
 81   45     2.50    .00    .5     .0   117.9707   176.1843    10
 82   46     2.75    .00    .5     .0    98.5038   171.4070    12
 83   47     3.00    .00    .5     .0   100.2050   227.7233     7
 84   48     3.25    .00    .5     .0   113.7566   304.1382     2
 85   49     3.50    .00    .5     .0   109.7395   300.1701     3
 86   50     3.50   -.05    .5     .0   110.8789   305.4872     1
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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 90 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE        20 FEBRUARY 1980

                         PART CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES       79/ 292 : HOUR 14

HOUR    THETA      SPEED   MIXING     TEMP   STABILITY
        (DEG)      (M/S) HEIGHT(M)    (K)      CLASS

 14    305.00      3.00  1900.00    299.00      2

                         1          2          3          4          5          6          7          8          9          10
FINAL HT (M)          649.00     522.98     522.98     309.86     309.86     309.86     511.26     511.26     511.26     396.81
FINAL HT (M)          396.81     396.81     239.28     239.28     158.46     158.46     158.46     158.46     158.46     158.46
FINAL HT (M)          158.46     158.46     447.49     447.49     447.49     447.49     419.08     419.08     419.08     419.08
DIST FIN HT (KM)         1.460      1.272      1.272       .898       .898       .898      1.299      1.299      1.299      1.090
DIST FIN HT (KM)         1.090      1.090       .769       .769       .581       .581       .581       .581       .581       .581
DIST FIN HT (KM)          .581       .581      1.158      1.158      1.158      1.158      1.125      1.125      1.125      1.125

  RANK        1          2          3          4          5          6          7          8          9         10        TOTAL      TOTAL
                                                                                                                          SIGNIF     ALL POINT
SOURCE #      8         27          1         13         14          3          2          4          5          6        POINT      SOURCES
RECEP #
   1        .000      6.183       .000       .000       .000       .000       .000       .000       .000       .000       6.183     16.651
   2        .000      6.248       .000       .000       .000       .000       .000       .000       .000       .000       6.248     17.004
   3        .000      6.983       .000       .000       .000       .000       .001       .000       .000       .000       6.984     19.680
   4        .000      8.474       .000       .004       .004       .002       .004       .000       .000       .000       8.489     25.321
   5        .000     10.738       .000       .302       .207       .015       .024       .000       .000       .000      11.286     36.262
   6        .005     13.604       .000      3.826      2.879       .087       .116       .000       .000       .000      20.518     60.348
   7        .216     16.546       .000     19.193     15.253       .419       .490       .000       .000       .000      52.116    114.197
   8        .638     18.660       .003     43.736     39.142      1.623      1.725       .000       .000       .000     105.528    192.797
   9        .504     18.965       .000     52.945     55.766      5.026      4.979       .000       .000       .000     138.186    238.114
  10        .152     16.969       .000     36.465     47.012     12.394     11.700       .005       .000       .000     124.698    232.190
  11        .018     13.110       .003     14.372     23.721     24.390     22.358       .261       .231       .002      98.263    209.126
  12        .001      8.604       .032      3.092      6.935     38.469     34.810      3.269       .838       .138      96.185    154.803
  13        .000      4.730       .214       .328      1.087     48.906     44.370     13.249      6.104      1.934     120.922    158.997
  14        .000      2.151       .907       .014       .080     50.417     46.554     19.957     14.891      8.215     143.186    190.706
  15        .000       .801      2.585       .000       .002     42.423     40.487     11.147     12.699     11.333     121.478    182.558
  16        .000       .242      5.167       .000       .000     29.365     29.447      1.983      3.462      5.646      75.308    137.221
  17        .000       .059      7.441       .000       .000     16.805     18.132       .096       .284       .678      43.496     89.752
  18        .000       .012      7.904       .000       .003      8.205      9.615       .000       .001       .005      25.745     50.921
  19        .000       .002      6.288       .000       .000      3.444      4.510       .000       .000       .000      14.244     24.276
  20        .000       .000      4.859       .000       .000      1.296      1.942       .000       .000       .000       8.097     11.116
  21        .000       .000      3.043       .000       .000       .463       .811       .000       .000       .000       4.317      5.170
  22        .000       .000      1.376       .000       .000       .171       .355       .000       .000       .000       1.902      2.114
  23        .000       .000       .355       .000       .000       .073       .180       .000       .000       .000        .607       .653
  24        .000       .000       .027       .000       .000       .041       .118       .000       .000       .000        .186       .195
  25        .000       .000       .000       .000       .000       .039       .115       .000       .000       .000        .154       .156
  26        .000       .000       .000       .000       .000       .061       .187       .000       .000       .000        .248       .248
  27        .000       .000       .000       .000       .000       .155       .431       .000       .000       .000        .586       .586
  28        .000       .000       .000       .000       .000       .469      1.060       .000       .000       .000       1.529      1.529
  29        .000       .000       .000       .000       .000       .894      1.664       .000       .000       .000       2.559      2.559
  30        .000       .002       .000       .000       .000       .514       .968       .000       .000       .000       1.484      1.501
  31        .000       .054       .000       .000       .000       .065       .169       .000       .000       .000        .289       .677
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32     .000    .657    .000    .000    .000    .003    .013    .000    .000    .000     .672    4.120
33     .000   2.771    .000    .000    .000    .000    .001    .000    .000    .000    2.772   13.016
34     .000   5.570    .000    .000    .000    .000    .000    .000    .000    .000    5.570   19.097
35     .000   6.796    .000    .000    .000    .000    .000    .000    .000    .000    6.796   20.230
36     .000   6.586    .000    .000    .000    .000    .000    .000    .000    .000    6.586   18.185
37     .000    .028    .000    .000    .000    .000    .000    .000    .000    .000     .028     .036
38     .000    .537    .000    .000    .000    .000    .000    .000    .000    .000     .537     .936
39     .000    .080    .000    .000    .000    .000    .000    .000    .000    .000     .080     .371
40     .000   1.404    .000    .000    .000    .000    .000    .000    .000    .000    1.404    3.997
41     .000    .490    .000    .000    .000    .000    .000    .000    .000    .000     .490    2.933
42     .000   3.594    .000    .000    .000    .000    .000    .000    .000    .000    3.594   13.981
43     .000    .000    .000    .000    .000    .000    .003    .000    .000    .000     .003     .003
44     .000    .000    .000    .000    .000    .062    .220    .000    .000    .000     .282     .283
45     .000    .000    .000    .000    .000    .002    .042    .000    .000    .000     .044     .044
46     .000    .000    .000    .000    .000    .248    .633    .000    .000    .000     .881     .881
47     .000    .000    .000    .000    .000    .244    .686    .000    .000    .000     .929     .929
48     .000    .003    .000    .000    .000   2.945   3.914    .000    .000    .000    6.862    6.881
49     .000   2.376    .000    .000    .000  16.959  18.047    .000    .000    .000   37.382   48.245
50     .000  12.970    .000    .164   2.084   3.354   3.818    .000    .000    .000   22.390   68.441
51     .000   4.832    .000    .006    .005    .002    .004    .000    .000    .000    4.849   13.972
52     .015  11.479    .000   2.591   1.867    .068    .089    .000    .000    .000   16.109   48.534
53     .025   7.840    .000   1.111    .781    .082    .055    .000    .000    .000    9.894   31.194
54     .023   5.142    .000    .462    .328    .027    .034    .000    .000    .000    6.015   19.336
55     .997  10.252    .000   8.325   6.030    .306    .339    .000    .000    .000   26.248   73.204
56     .504  18.965    .000  52.945  55.766   5.026   4.979    .000    .000    .000  138.186  238.114
57    4.113  14.900    .000  34.122  27.410   1.897   1.898    .000    .000    .000   84.340  189.981
58     .000   7.083    .001    .172   1.005  29.721  28.114    .095    .003    .000   66.193   95.582
59     .000  11.981    .001   6.081  13.502  23.177  21.627    .053    .003    .000   76.421  151.062
60     .112  15.782    .001  29.380  40.176  16.456  15.296    .034    .002    .000  117.238  236.879
61    1.590  17.374    .001  51.600  54.650  11.028  10.273    .020    .002    .000  146.536  286.571
62     .000    .000    .050    .000    .000    .218    .483    .000    .000    .000     .750     .944
63     .000    .001    .084    .000    .000   2.691   4.083    .000    .000    .000    6.859   11.312
64     .000    .018    .089    .000    .000  11.931  14.421    .000    .000    .000   26.459   38.392
65     .000    .200    .076    .000    .000  27.303  28.827    .173    .287    .134   57.000   72.045
66     .000   1.047    .062    .000    .000  40.558  39.560   4.663   2.476    .486   88.853  107.667
67     .000   3.216    .050    .011    .090  45.283  42.227   5.503   1.926    .329   98.634  122.765
68     .016  10.705    .027   8.710  15.192  33.995  30.627   2.401    .606    .100  102.375  203.198
69    3.256  15.432    .014  42.970  45.887  17.962  16.171    .595    .152    .029  142.456  319.527
70     .000    .000    .000    .000    .000    .000    .000    .000    .000    .000     .000     .000
71     .000    .332   1.203    .000    .000  33.445  33.494   2.417   4.064   4.989   79.944  124.025
72     .000   3.265    .670    .103    .394  51.625  47.020  21.490  13.955   6.661  145.382  190.552
73     .000    .000    .000    .000    .000    .000    .000    .000    .000    .000     .000     .000
74     .000    .000    .000    .000    .000    .000    .000    .000    .000    .000     .000     .000
75     .000    .000    .108    .000    .000    .000    .000    .000    .000    .000     .108     .108
76     .000    .000   1.553    .000    .000    .008    .023    .000    .000    .000    1.584    1.586
77     .000    .000   4.509    .000    .000    .217    .401    .000    .000    .000    5.127    5.466
78     .000    .001   6.320    .000    .000   1.947   2.728    .000    .000    .000   10.996   14.340
79     .000    .012   7.994    .000    .000   8.205   9.618    .000    .001    .005   25.785   50.920
80     .000    .098   7.945    .000    .000  20.512  21.432    .330    .779   1.719   52.805  107.127
81     .000    .458   6.672    .000    .001  35.581  34.512   7.026  10.193  12.448  106.871  179.644
82     .000   1.414   4.993    .011    .051  47.550  44.040  25.265  27.198  24.474  175.136  249.523
83     .000   3.175   3.477    .317    .823  52.786  47.508  36.272  31.539  23.264  199.157  268.139
84     .022   5.597   2.318   2.528   4.531  51.238  45.345  32.285  24.070  15.416  183.350  260.230
85     .397   8.189   1.509   8.924  12.586  45.125  39.590  22.307  14.892   8.653  162.174  272.426
86     .303   7.482   2.120   7.221  10.447  46.863  41.124  26.268  18.523  11.565  171.915  [illegible].842
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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 50 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE       20 FEBRUARY 1982

              PART SUMMARY CONCENTRATION TABLE(MICROGRAMS/M**3)        80/ 292 : HOUR 18

  RECEPTOR          EAST      NORTH     RECEPTOR HT       RECEPTOR         TOTAL FROM      TOTAL FROM    CONCENTRATION
  NO. NAME          COORD     COORD     ABV GRD (M)     GRD-LVL ELEV     SIGNIF POINT     ALL SOURCES        RANK
                                                      (USER HT UNITS)       SOURCES

   1   10, 1.0      2.17      1.98         .0                  .0          6.1831          16.6506            50
   2   20, 1.0      2.34      1.94         .0                  .0          6.2478          17.0041            49
   3   30, 1.0      2.50      1.87         .0                  .0          6.9800          19.6799            45
   4   40, 1.0      2.64      1.77         .0                  .0          8.4882          25.3213            42
   5   50, 1.0      2.77      1.64         .0                  .0         11.2862          36.2619            40
   6   60, 1.0      2.87      1.50         .0                  .0         20.5185          60.3477            34
   7   70, 1.0      2.94      1.34         .0                  .0         52.1164         114.1967            26
   8   80, 1.0      2.98      1.17         .0                  .0        105.5236         192.7975            14
   9   90, 1.0      3.00      1.00         .0                  .0        138.1856         238.1135             9
  10  100, 1.0      2.98       .83         .0                  .0        124.6978         232.1898            11
  11  110, 1.0      2.94       .66         .0                  .0         98.2627         209.1261            12
  12  120, 1.0      2.87       .50         .0                  .0         96.1850         154.8028            21
  13  130, 1.0      2.77       .36         .0                  .0        120.9219         158.9970            20
  14  140, 1.0      2.64       .23         .0                  .0        143.1860         190.7062            15
  15  150, 1.0      2.50       .13         .0                  .0        121.4777         182.5584            18
  16  160, 1.0      2.34       .06         .0                  .0         75.3082         137.2211            23
  17  170, 1.0      2.17       .02         .0                  .0         43.4956          89.7522            30
  18  180, 1.0      2.00       .00         .0                  .0         25.7450          50.9206            35
  19  190, 1.0      1.83       .02         .0                  .0         14.2435          24.2757            43
  20  200, 1.0      1.66       .06         .0                  .0          8.0970          11.1159            56
  21  210, 1.0      1.50       .13         .0                  .0          4.3169           5.1699            59
  22  220, 1.0      1.36       .23         .0                  .0          1.9018           2.1138            64
  23  230, 1.0      1.23       .36         .0                  .0           .6068            .6526            73
  24  240, 1.0      1.13       .50         .0                  .0           .1861            .1958            78
  25  250, 1.0      1.06       .66         .0                  .0           .1540            .1557            79
  26  260, 1.0      1.02       .83         .0                  .0           .2470            .2481            77
  27  270, 1.0      1.00      1.00         .0                  .0           .5860            .5860            74
  28  280, 1.0      1.02      1.17         .0                  .0          1.5287           1.5288            66
  29  290, 1.0      1.06      1.34         .0                  .0          2.5586           2.5591            63
  30  300, 1.0      1.13      1.50         .0                  .0          1.4883           1.5009            67
  31  310, 1.0      1.23      1.64         .0                  .0           .2889            .6766            72
  32  320, 1.0      1.36      1.77         .0                  .0           .6728           4.1203            60
  33  330, 1.0      1.50      1.87         .0                  .0          2.7716          13.0157            54
  34  340, 1.0      1.66      1.94         .0                  .0          5.5290          19.0967            47
  35  350, 1.0      1.83      1.98         .0                  .0          6.7958          20.2208            44
  36  360, 1.0      2.00      2.00         .0                  .0          6.5862          18.1851            48
  37  1             1.00      2.50         .0                  .0           .0278            .0355            82
  38  2             1.25      2.40         .0                  .0           .5378            .9355            69
  39  3             1.00      2.25         .0                  .0           .0798            .3710            75
  40  4             1.25      2.25         .0                  .0          1.4043           3.9973            61
  41  5             1.20      2.00         .0                  .0           .4902           2.9326            62
  42  6             1.50      2.00         .0                  .0          3.5938          13.9412            53
  43  7              .75      1.70         .0                  .0           .0028            .0028            83
  44  8             1.00      1.60         .0                  .0           .2823            .2834            76
  45  9              .75      1.50         .0                  .0           .0445            .0445            81
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46   10      1.00   1.50    .0        .0     .8806     .8810    71
47   11       .95   1.25    .0        .0     .9298     .9298    70
48   12      1.25   1.25    .0        .0    6.8621    6.8813    57
49   13      2.00   1.00    .0        .0   37.3824   48.2852    38
50   14      2.25   1.25    .0        .0   22.3898   68.4412    33
51   15      3.00   1.75    .0        .0    9.8887   13.9722    52
52   16      3.00   1.50    .0        .0   16.1092   48.5339    37
53   17      3.25   1.50    .0        .0    9.8942   31.1943    41
54   18      3.50   1.50    .0        .0    6.0151   19.3362    46
55   19      3.50   1.25    .0        .0   26.2481   73.2038    31
56   20      3.00   1.00    .0        .0  138.1856  238.1136     8
57   21      3.50   1.00    .0        .0   84.3909  189.9808    17
58   22      2.50    .75    .0        .0   66.1934   95.5827    29
59   23      2.75    .75    .0        .0   76.4211  151.0622    22
60   24      3.00    .75    .0        .0  117.2382  236.8791    10
61   25      3.25    .75    .0        .0  146.5359  286.5713     2
62   26      1.25    .50    .0        .0     .7502     .9441    68
63   27      1.50    .50    .0        .0    6.8595   11.3117    55
64   28      1.75    .50    .0        .0   26.8587   38.3919    39
65   29      2.00    .50    .0        .0   57.0000   72.0846    32
66   30      2.25    .50    .0        .0   88.8529  107.6669    27
67   31      2.50    .50    .0        .0   98.6335  122.7653    25
68   32      3.00    .50    .0        .0  102.3749  203.1977    13
69   33      3.50    .50    .0        .0  142.4565  319.5272     1
70   34       .75    .25    .0        .0     .0003     .0003    84
71   35      2.25    .25    .0        .0   79.9440  124.0246    24
72   36      2.75    .25    .0        .0  145.3818  190.5523    16
73   37       .50    .00    .0        .0     .0000     .0000    86
74   38       .75    .00    .0        .0     .0001     .0001    85
75   39      1.00    .00    .0        .0     .1080     .1080    80
76   40      1.25    .00    .0        .0    1.5840    1.5864    65
77   41      1.50    .00    .0        .0    5.1271    5.4662    58
78   42      1.75    .00    .0        .0   10.9955   16.3398    51
79   43      2.00    .00    .0        .0   25.7449   50.9205    36
80   44      2.25    .00    .0        .0   52.8054  107.1267    28
81   45      2.50    .00    .0        .0  106.8710  179.6439    19
82   46      2.75    .00    .0        .0  175.1362  249.5225     7
83   47      3.00    .00    .0        .0  199.1567  268.1398     5
84   48      3.25    .00    .0        .0  183.3502  260.2297     6
85   49      3.50    .00    .0        .0  162.1738  272.4260     4
86   50      3.50   -.25    .0        .0  171.7154  274.8427     3
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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 50 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE        20 FEBRUARY 1980

               3-HOUR AVERAGE PART CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANT POINT SOURCES      79/292  START HOUR: 12

   RANK       1        2        3        4        5        6        7        8        9       10       TOTAL      TOTAL
                                                                                                       SIGNIF     ALL POINT
                                                                                                       POINT      SOURCES
 SOURCE #     8       27        1       13       14        3        2        4        5        6
 RECEP #
    1       .000    5.296     .000     .000     .000     .049     .101     .000     .000     .000      5.446     18.970
    2       .000    6.217     .000     .000     .000     .119     .209     .000     .000     .000      6.545     22.808
    3       .000    7.063     .000     .008     .020     .311     .475     .000     .000     .000      7.877     27.126
    4       .000    7.764     .000     .431     .493     .811    1.088     .000     .000     .000     10.588     33.547
    5       .000    8.261     .000    2.815    3.216    1.961    2.359     .000     .000     .000     18.611     46.287
    6       .013    8.539     .000    9.519   10.485    4.198    4.623     .000     .000     .000     37.378     70.084
    7       .130    8.638     .001   17.693   18.899    7.750    7.973     .000     .000     .000     61.084     99.296
    8       .407    8.614     .008   23.275   24.259   12.198   11.943     .001     .000     .000     80.705    125.124
    9       .662    8.493     .058   25.885   26.551   16.453   15.586     .055     .007     .001     93.750    149.472
   10       .625    8.299     .299   26.097   26.816   19.497   18.110     .736     .185     .032    100.697    177.503
   11       .343    8.378    1.069   23.421   25.225   21.197   19.484    3.470    1.401     .465    104.244    195.006
   12       .104    7.839    2.755   16.604   20.350   22.126   20.232    7.335    4.679    2.350    104.375    193.088
   13       .016    7.451    5.291    8.065   12.194   22.671   20.700    9.340    7.329    5.071     98.147    168.278
   14       .001    6.692    7.834    2.397    4.787   22.768   20.835    9.507    7.873    6.134     88.827    145.274
   15       .000    5.463    9.285     .392    1.111   22.375   20.584    8.132    6.875    5.558     79.775    129.047
   16       .000    3.943    9.180     .031     .136   21.550   20.008    5.041    4.618    4.498     69.005    111.050
   17       .000    2.483    7.883     .001     .007   20.001   18.953    1.439    1.831    2.221     54.819     88.419
   18       .000    1.762    5.882     .000     .000   17.009   17.037     .127     .197     .295     42.310     66.891
   19       .000     .657    3.851     .000     .000   13.702   14.148     .001     .002     .002     32.364     48.152
   20       .000     .285    2.746     .000     .000    9.652   10.723     .000     .000     .000     23.406     31.766
   21       .000     .114    1.696     .000     .000    6.134    7.469     .000     .000     .000     15.413     19.389
   22       .000     .045     .819     .000     .000    3.610    4.892     .000     .000     .000      9.367     11.119
   23       .000     .018     .276     .000     .000    2.052    3.122     .000     .000     .000      5.468      6.083
   24       .000     .009     .054     .000     .000    1.189    2.023     .000     .000     .000      3.274      3.444
   25       .000     .005     .004     .000     .000     .790    1.382     .000     .000     .000      2.181      2.221
   26       .000     .005     .000     .000     .000     .734    1.197     .000     .000     .000      1.935      1.955
   27       .000     .006     .000     .000     .000     .739    1.204     .000     .000     .000      1.949      1.976
   28       .000     .015     .000     .000     .000     .683    1.110     .000     .000     .000      1.807      1.868
   29       .000     .049     .000     .000     .000     .510     .888     .000     .000     .000      1.447      1.645
   30       .000     .195     .000     .000     .000     .380     .690     .000     .000     .000      1.265      2.033
   31       .000     .655     .000     .000     .000     .256     .481     .000     .000     .000      1.392      3.816
   32       .000    1.474     .000     .000     .000     .114     .246     .000     .000     .000      1.835      6.500
   33       .000    2.121     .000     .000     .000     .045     .110     .000     .000     .000      2.277      8.347
   34       .000    2.720     .000     .000     .000     .024     .059     .000     .000     .000      2.803      9.647
   35       .000    3.492     .000     .000     .000     .019     .047     .000     .000     .000      3.558     12.203
   36       .000    4.365     .000     .000     .000     .025     .059     .000     .000     .000      4.449     15.407
   37       .000     .021     .000     .000     .000     .000     .000     .000     .000     .000       .021       .039
   38       .000     .411     .000     .000     .000     .000     .000     .000     .000     .000       .411      1.057
   39       .000     .148     .000     .000     .000     .000     .000     .000     .000     .000       .148       .407
   40       .000     .740     .000     .000     .000     .000     .000     .000     .000     .000       .740      2.299
   41       .000     .883     .000     .000     .000     .000     .002     .000     .000     .000       .885      3.367
   42       .000    1.979     .000     .000     .000     .003     .014     .000     .000     .000      1.997      7.297
   43       .000     .000     .000     .000     .000     .000     .003     .000     .000     .000       .004       .004
   44       .000     .047     .000     .000     .000     .068     .209     .000     .000     .000       .324       .529
   45       .000     .000     .000     .000     .000     .004     .036     .000     .000     .000       .039       .040
   46       .000     .033     .000     .000     .000     .141     .358     .000     .000     .000       .532       .675
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47	.000	.006	.000	.000	.000	.360	.700	.000	.000	.000	1.066	1.091
48	.000	.362	.000	.000	.000	1.513	1.968	.000	.000	.000	3.843	5.226
49	.000	6.668	.005	.000	.011	9.909	10.677	.000	.000	.000	27.270	49.027
50	.000	8.320	.000	1.949	5.390	8.514	9.218	.000	.000	.000	33.392	59.847
51	.000	7.687	.000	.952	1.051	.977	1.714	.000	.000	.000	11.880	35.315
52	.057	8.420	.000	10.685	10.920	4.090	4.452	.000	.000	.000	38.625	72.238
53	.192	8.058	.000	10.888	9.864	3.772	4.038	.000	.000	.000	36.408	72.092
54	.307	7.543	.000	8.696	7.875	3.377	3.566	.000	.000	.000	31.365	67.745
55	1.250	7.745	.008	20.515	19.140	8.321	8.158	.002	.000	.000	65.139	116.833
56	.662	8.493	.058	25.885	26.551	16.853	15.586	.055	.007	.001	93.750	149.472
57	2.169	7.640	.096	25.091	24.111	14.486	13.528	.119	.027	.005	87.271	154.229
58	.000	8.268	.347	5.073	10.170	18.479	17.682	.936	.235	.027	61.216	100.806
59	.038	8.370	.464	18.464	22.558	19.865	18.599	1.241	.358	.065	90.023	157.149
60	.681	8.167	.563	25.792	26.535	20.422	18.833	1.492	.558	.131	103.335	190.466
61	1.817	7.836	.635	26.499	26.031	20.193	18.430	1.813	.669	.190	104.103	203.975
62	.000	.035	.134	.000	.000	2.547	3.717	.000	.000	.000	6.433	7.214
63	.000	.343	.412	.000	.000	7.081	8.335	.000	.000	.000	16.171	20.693
64	.000	1.500	.726	.000	.000	11.832	12.501	.000	.000	.000	26.559	38.280
65	.000	3.674	.998	.000	.001	15.734	15.710	.402	.232	.080	36.830	58.599
66	.000	5.977	1.581	.046	.293	18.766	18.057	2.385	1.613	.839	49.548	83.689
67	.000	7.411	2.154	1.052	4.700	20.795	19.492	3.993	2.785	1.494	64.766	110.209
68	.402	7.736	2.481	21.330	23.326	22.254	20.222	8.193	5.178	2.625	114.137	221.305
69	3.738	7.073	2.958	23.294	22.533	21.521	19.259	7.576	4.697	2.490	115.120	238.663
70	.000	.000	.002	.000	.000	.006	.026	.000	.000	.000	.034	.038
71	.000	4.370	4.915	.014	.085	20.263	19.152	3.393	3.250	2.735	58.176	94.598
72	.008	7.051	7.906	5.271	8.664	23.016	20.945	11.027	9.263	7.284	100.436	166.118
73	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
74	.000	.000	.012	.000	.000	.003	.013	.000	.000	.000	.028	.028
75	.000	.000	.281	.000	.000	.122	.279	.000	.000	.000	.683	.686
76	.000	.007	1.076	.000	.000	1.248	1.978	.000	.000	.000	4.308	4.631
77	.000	.076	2.255	.000	.000	5.195	6.460	.000	.000	.000	13.985	17.374
78	.000	.420	3.498	.000	.000	11.618	12.409	.000	.000	.000	27.946	40.250
79	.000	1.362	5.882	.000	.000	17.409	17.037	.127	.197	.295	42.310	66.891
80	.000	2.944	9.084	.004	.027	20.846	19.509	2.809	2.930	3.313	61.464	99.053
81	.000	4.684	12.311	.217	.638	22.524	20.610	9.293	8.500	7.324	86.099	135.473
82	.004	5.957	14.938	2.191	4.039	23.285	21.032	14.256	13.194	11.820	110.716	171.960
83	.127	6.514	16.571	7.888	10.648	23.407	20.938	16.980	16.073	14.818	133.934	218.660
84	1.068	6.517	17.147	14.334	16.074	22.994	20.826	17.910	17.168	15.998	149.635	263.795
85	3.650	6.258	16.880	17.446	17.665	22.216	19.637	17.592	16.857	15.530	153.692	282.600
86	3.468	6.177	18.628	16.647	17.024	22.193	19.603	17.807	17.284	16.281	155.112	281.790

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EXAMPLE FOUR - APPLICATION FOR 30 SOURCES AND 90 RECEPTORS
POLLUTANT TSP IS BEING MODELED USING 3 HRS OF MET DATA
DATA INPUT BY TOM PIERCE       20 FEBRUARY 1980

              3-HOUR AVERAGE PART SUMMARY CONCENTRATION TABLE(MICROGRAMS/M**3)     79/292  START HOUR: 12

  RECEPTOR          EAST      NORTH    RECEPTOR HT       RECEPTOR         TOTAL FROM     TOTAL FROM  CONCENTRATION
  NO. NAME          COORD     COORD    ABV GRD (M)    GRD-LVL ELEV      SIGNIF POINT    ALL SOURCES       RANK
                                                     (USER HT UNITS)      SOURCES

   1   10. 1.0       2.17      1.98        .0                .0             5.4061        18.9696          52
   2   20. 1.0       2.34      1.94        .0                .0             6.5445        22.8084          49
   3   30. 1.0       2.50      1.87        .0                .0             7.8768        27.1260          48
   4   40. 1.0       2.64      1.77        .0                .0            10.5876        33.5466          46
   5   50. 1.0       2.77      1.64        .0                .0            18.6115        46.2871          42
   6   60. 1.0       2.87      1.50        .0                .0            37.3779        70.0837          34
   7   70. 1.0       2.94      1.34        .0                .0            61.0837        99.2963          27
   8   80. 1.0       2.98      1.17        .0                .0            80.7051       125.1245          22
   9   90. 1.0       3.00      1.00        .0                .0            93.7501       149.4724          18
  10  100. 1.0       2.98       .83        .0                .0           100.6967       177.5033          11
  11  110. 1.0       2.94       .66        .0                .0           104.2442       195.0063           8
  12  120. 1.0       2.87       .50        .0                .0           104.3750       193.0878           9
  13  130. 1.0       2.77       .36        .0                .0            98.1475       168.2783          13
  14  140. 1.0       2.64       .23        .0                .0            88.8269       145.2740          19
  15  150. 1.0       2.50       .13        .0                .0            79.7754       129.0466          21
  16  160. 1.0       2.34       .06        .0                .0            69.0047       111.0500          24
  17  170. 1.0       2.17       .02        .0                .0            54.8186        88.4193          30
  18  180. 1.0       2.00       .00        .0                .0            42.3100        66.8913          36
  19  190. 1.0       1.83       .02        .0                .0            32.3638        48.1517          41
  20  200. 1.0       1.66       .06        .0                .0            23.4057        31.7660          47
  21  210. 1.0       1.50       .13        .0                .0            15.4131        19.3886          51
  22  220. 1.0       1.36       .23        .0                .0             9.3668        11.1192          56
  23  230. 1.0       1.23       .36        .0                .0             5.4680         6.0828          62
  24  240. 1.0       1.13       .50        .0                .0             3.2744         3.4438          66
  25  250. 1.0       1.06       .66        .0                .0             2.1809         2.2213          69
  26  260. 1.0       1.02       .83        .0                .0             1.9349         1.9548          72
  27  270. 1.0       1.00      1.00        .0                .0             1.9489         1.9758          71
  28  280. 1.0       1.02      1.17        .0                .0             1.8071         1.8677          73
  29  290. 1.0       1.06      1.34        .0                .0             1.6471         1.6450          74
  30  300. 1.0       1.13      1.50        .0                .0             1.2648         2.0332          70
  31  310. 1.0       1.23      1.64        .0                .0             1.3919         3.8160          65
  32  320. 1.0       1.36      1.77        .0                .0             1.8345         6.5004          61
  33  330. 1.0       1.50      1.87        .0                .0             2.2769         8.3866          58
  34  340. 1.0       1.66      1.94        .0                .0             2.8030         9.6466          57
  35  350. 1.0       1.83      1.98        .0                .0             3.5580        12.2027          55
  36  360. 1.0       2.00      2.00        .0                .0             4.4498        15.4068          54
  37   1             1.00      2.50        .0                .0              .0214          .0386          82
  38   2             1.25      2.40        .0                .0              .4108         1.0568          76
  39   3             1.00      2.25        .0                .0              .1483          .4069          80
  40   4             1.25      2.25        .0                .0              .7400         2.2994          68
  41   5             1.20      2.00        .0                .0              .8853         3.3674          67
  42   6             1.50      2.00        .0                .0             1.9967         7.2974          59
  43   7              .75      1.70        .0                .0              .0036          .0041          85
  44   8             1.00      1.60        .0                .0              .3284          .5293          79
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 45   9      .75   1.50    .0        .0     .0398     .0398    81
 46  10     1.00   1.50    .0        .0     .5316     .6745    78
 47  11      .95   1.25    .0        .0    1.0663    1.0912    75
 48  12     1.25   1.25    .0        .0    3.8432    5.2264    63
 49  13     2.00   1.00    .0        .0   27.2701   49.0266    40
 50  14     2.25   1.25    .0        .0   33.3916   59.8869    38
 51  15     3.00   1.75    .0        .0   11.8802   35.3149    45
 52  16     3.00   1.50    .0        .0   38.6246   72.2380    32
 53  17     3.25   1.50    .0        .0   36.4082   72.0918    33
 54  18     3.50   1.50    .0        .0   31.3687   67.7449    35
 55  19     3.50   1.25    .0        .0   65.1387  116.8328    23
 56  20     3.00   1.00    .0        .0   93.7501  149.4724    17
 57  21     3.50   1.00    .0        .0   87.2714  154.2288    16
 58  22     2.50    .75    .0        .0   61.2157  100.8060    26
 59  23     2.75    .75    .0        .0   90.0226  157.1498    15
 60  24     3.00    .75    .0        .0  103.3345  190.4660    10
 61  25     3.25    .75    .0        .0  104.1034  203.9746     7
 62  26     1.25    .50    .0        .0    6.8333    7.2144    60
 63  27     1.50    .50    .0        .0   16.1711   20.6934    50
 64  28     1.75    .50    .0        .0   26.5585   38.2403    44
 65  29     2.00    .50    .0        .0   36.8299   58.5985    39
 66  30     2.25    .50    .0        .0   49.5484   83.6888    31
 67  31     2.50    .50    .0        .0   64.7664  110.2088    25
 68  32     3.00    .50    .0        .0  114.1375  221.3053     5
 69  33     3.50    .50    .0        .0  115.1202  238.6626     4
 70  34      .75    .25    .0        .0     .0348     .0348    83
 71  35     2.25    .25    .0        .0   58.1759   94.5984    29
 72  36     2.75    .25    .0        .0  100.8357  166.1181    18
 73  37      .50    .00    .0        .0     .0001     .0001    86
 74  38      .75    .00    .0        .0     .0282     .0282    84
 75  39     1.00    .00    .0        .0     .6827     .6862    77
 76  40     1.25    .00    .0        .0    4.3084    4.6311    64
 77  41     1.50    .00    .0        .0   13.9853   17.3742    53
 78  42     1.75    .00    .0        .0   27.9456   40.2500    43
 79  43     2.00    .00    .0        .0   42.3099   66.8913    37
 80  44     2.25    .00    .0        .0   61.4644   99.0525    28
 81  45     2.50    .00    .0        .0   86.0993  135.4729    20
 82  46     2.75    .00    .0        .0  110.7158  171.9603    12
 83  47     3.00    .00    .0        .0  133.0345  218.6603     6
 84  48     3.25    .00    .0        .0  149.6346  263.7947     3
 85  49     3.50    .00    .0        .0  153.6917  282.5996     1
 86  50     3.50   -.05    .0        .0  155.1120  281.7904     2
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APPENDIX A

POINT SOURCE COMPUTATIONS

Given an east-north coordinate system (R, S), then the upwind distance, x, and the crosswind distance, y, of a point source from a receptor are given by:

$$x = (S_p - S_r) \cos \theta + (R_p - R_r) \sin \theta \quad \text{(A1)}$$

$$y = (S_p - S_r) \sin \theta - (R_p - R_r) \cos \theta \quad \text{(A2)}$$

where R_p, S_p are the coordinates of the point source; R_r, S_r are the coordinates of the receptor, and θ is the wind direction (the direction from which the wind blows). The units of x and y will be the same as those of the coordinate system R, S. In order to determine plume dispersion parameters, distances must be in kilometers or meters. A conversion may be required to convert x and y above to the appropriate units.

The various forms of the Gaussian equation given below are based upon the coordinate scheme with the origin at the ground, and x upwind from the receptor, y crosswind, and z vertical. The Gaussian equations for continuous releases have four components: 1) concentrations are proportional to emission rate, 2) the released effluent is diluted by the wind passing the point of release, 3) the effluent is spread horizontally resulting in a Gaussian or normal (bell-shaped) crosswind distribution at downwind distances, and 4) the effluent is spread vertically. This latter component also results in a normal vertical distribution near the source, which at greater downwind distances is modified by eddy reflection at the ground and, if appropriate, by eddy reflection at the mixing height. Equations A3, A4 and A5 are broken into these four components (see below).

The following symbols are defined:

χ_p,	concentration, g m^{-3}
Q ,	emission rate, g s^{-1}

u ,	wind speed, m s^{-1}
σ_y,	standard deviation of plume concentration horizontal distribution (evaluated at the distance x and for appropriate stability), m
σ_z,	standard deviation of plume concentration vertical distribution (evaluated at the distance x and for appropriate stability), m
L ,	mixing height, m
H ,	effective height of emission, m
z ,	receptor height above ground, m
y ,	crosswind distance, m

The contribution to the concentration, χ_p, from a single point source to a receptor is given by one of the three following equations where the expressions g_1, g_2, g_3, are defined below.

Component: (1) (2) (3) (4)

$$\chi_p = Q \cdot \frac{1}{u} \cdot \frac{g_1}{\sqrt{2\pi}\ \sigma_y} \cdot \frac{g_2}{\sqrt{2\pi}\ \sigma_z} \tag{A3}$$

$$\chi_p = Q \cdot \frac{1}{u} \cdot \frac{g_1}{\sqrt{2\pi}\ \sigma_y} \cdot \frac{1}{L} \tag{A4}$$

$$\chi_p = Q \cdot \frac{1}{u} \cdot \frac{g_1}{\sqrt{2\pi}\ \sigma_y} \cdot \frac{g_3}{\sqrt{2\pi}\ \sigma_z} \tag{A5}$$

For stable conditions or unlimited mixing use equation (A3).

For unstable or neutral conditions, where σ_z is equal to or greater than 1.6 L, use equation (A4).

For unstable or neutral conditions where σ_z is less than 1.6 L, use equation (A5), provided that both H and z are less than L.

Sensitivity tests using equation (A5) have indicated that for all H and all z between the ground and the mixing height, the vertical distribution of concentration with height is uniform when σ_z has increased to 1.6 L. Therefore, when σ_z is equal to or greater than 1.6 L for neutral or unstable conditions, use equation (A4). For special cases such as $z = 0$, equation (A4) may give appropriate concentrations for σ_z much less than 1.6 L. However, the above recommendation covers the more general case. (Note that this recommendation differs from that of Pasquill (1976) and the Stability Workshop (Hanna, 1977), which indicate that σ_z should not be allowed to increase beyond 0.8 L.) For ground level receptors, $z = 0$, the use of $\sigma_z = 0.8L$ in equation (A3) reduces to equation (A4). However, the above recommendation allows σ_z to increase beyond the value of L, specifically as large as 1.6 L; it also allows for a smooth transition to a uniform vertical profile for receptors above the ground, $z \neq 0$, and for effective heights of emission approaching the mixing height.

Definitions for expressions g_1, g_2, g_3 follow:

$$g_1 = \exp\ (-0.5\ y^2/\sigma_y^2)$$

$$g_2 = \exp\ [-0.5(z-H)^2/\sigma_z^2] + \exp\ [-0.5(z+H)^2/\sigma_z^2]$$

$$g_3 = \sum_{N=-\infty}^{\infty} \{\exp\ [-0.5(zH+2NL)^2/\sigma_z^2] + \exp\ [-0.5(z+H+2NL)^2/\sigma_z^2]\}$$

(This infinite series converges rapidly and evaluation with N varying from -4 to +4 is usually sufficient.)

REFERENCES -- APPENDIX A

Hanna, S. R., G. A. Briggs, J. Deardorff, B. A. Egan, F. A. Gifford and F. Pasquill, 1977: AMS Workshop on Stability Classification Schemes and Sigma Curves - Summary of Recommendations. Bull. Am. Meteorol. Soc., 58: 1305-1309.

Pasquill, F., 1976: Atmospheric dispersion parameters in Gaussian plume modeling. Part II. Possible requirements for change in the Turner Workbook values. EPA-600/4-76-030b. U.S. Environmental Protection Agency, Research Triangle Park, N.C. 44 pp.

APPENDIX B

PLUME RISE FOR POINT SOURCES

The manner in which the methods of Briggs are used to estimate plume rise and effective height of emission are discussed below.

First, actual or estimated wind speed at stack top, $u(h)$, is assumed to be available.

Stack Downwash

In order to consider stack downwash, modification of the physical stack height is performed following Briggs (1973, p. 4). The h' is found from:

$$h' = h + 2 \left[\left(v_s/u(h) \right) - 1.5 \right] d \quad \text{for } v_s < 1.5\, u(h) \qquad (B1)$$

$$h' = h \text{ for } v_s \geq 1.5\, u(h)$$

where h is physical stack height, v_s is stack gas velocity, m s^{-1}, and d is inside stack-top diameter, m. This h' is used throughout the remainder of the plume height computation. If stack downwash is not considered, h' = h in the following equations.

Buoyancy Flux

For most plume rise situations, the value of the Briggs buoyancy flux parameter, F, in m^4 s^{-3} is needed. The following equation is equivalent to equation (12), (Briggs, 1975, p. 63):

$$F = \frac{g\, v_s\, d^2\, \Delta T}{4\, T_s} \qquad (B2)$$

where $\Delta T = T_s - T$, T_s is stack gas temperature, K, and T is ambient air temperature, K.

Unstable or Neutral —— Crossover between Momentum and Buoyancy

For cases with stack gas temperature greater than ambient air temperature. whether the plume rise is dominated by momentum or buoyancy must be determined. The crossover temperature difference $(\Delta T)_c$ is determined for 1) F less than 55, and 2) F greater than or equal to 55. If the difference between stack gas temperature and ambient air temperature, ΔT, exceeds the $(\Delta T)_c$, the plume rise is assumed to be buoyancy dominated; if less than this amount, the plume rise is assumed to be momentum dominated (see below).

For F less than 55, the crossover temperature difference is found by setting Equation (5.2) (Briggs, 1969, p. 59) equal to the combination of Equations (6) and (7) (Briggs, 1971, p. 1031) and solving for ΔT. The result is:

$$(\Delta T)_c = 0.0297\ T_s\ v_s^{1/3} / d^{2/3} \tag{B3}$$

For F equal to or greater than 55, the crossover temperature difference is found by setting Equation (5.2) (Briggs, 1969, p. 59) equal to the combination of Equation (6) and (7) (Briggs, 1971, p. 1031) and solving for ΔT. The result is:

$$(\Delta T)_c = 0.00575\ T_s\ v_s^{2/3}/d^{1/3} \tag{B4}$$

Unstable or Neutral —— Buoyancy Rise

For situations where ΔT exceeds $(\Delta T)_c$ as determined above, buoyancy is assumed to dominate. The distance to final rise x_f in kilometers, is determined from the equivalent of Equation (7), (Briggs, 1971, p. 1031), and the distance to final rise is assumed to be 3.5 x*, where x* is the distance at which atmospheric turbulence begins to dominate entrainment.

For F less than 55:

$$x_f = 0.049\ F^{5/8} \tag{B5}$$

For F equal to or greater than 55:

$$x_f = 0.119\ F^{2/5} \tag{B6}$$

The plume height, H, in meters, is determined from the equivalent of the combination of Equations (6) and (7) (Briggs, 1971, p. 1031):

For F less than 55:

$$H = h' + 21.425\, F^{3/4}/u(h) \tag{B7}$$

For F equal to or greater than 55:

$$H = h' + 38.71\, F^{3/5}/u(h) \tag{B8}$$

Unstable or Neutral —— Momentum Rise

For situations where the stack gas temperature is less than or equal to the ambient air temperature, the assumption is made that the plume rise is dominated by momentum. If ΔT is less than $(\Delta T)_c$ from Equation (B3) or (B4), the assumption is also made that the plume rise is dominated by momentum. The plume height is calculated from Equation (5.2) (Briggs, 1969, p. 59):

$$H = h' + 3d\, v_s/u(h) \tag{B9}$$

Briggs (1969, p. 59) suggests that this equation is most applicable when v_s/u is greater than 4. Since momentum rise occurs quite close to the point of release, the distance to final rise is set equal to zero.

Stability Parameter

For stable situations the stability parameter s is calculated from the equation (Briggs, 1971, p. 1031):

$$s = g \frac{\partial\theta/\partial z}{T} \tag{B10}$$

As an approximation, for stability class E, or 5, $\partial\theta/\partial z$ is taken as 0.02 K m^{-1}, and for stability class F, or 6, $\partial\theta/\partial z$ is taken as 0.035 K m^{-1}.

Stable —— Crossover between Momentum and Buoyancy

For cases with stack gas temperatures greater than ambient air temperature, determining whether the plume rise is dominated by momentum or buoyancy is necessary. The crossover temperature difference $(\Delta T)_c$ is found by setting Equation (59) (Briggs, 1975, p. 96) equal to Equation (4.28), (Briggs, 1969, p. 59) and solving for ΔT. The result is:

$$(\Delta T)_c = 0.01958\, T\, v_s\, s^{1/2} \tag{B11}$$

If the difference between stack gas temperature and ambient air temperature, ΔT, exceeds the $(\Delta T)_c$, the plume rise is assumed to be buoyancy dominated; if less than this amount, the plume rise is assumed to be momentum dominated.

Stable —— Buoyancy Rise

For situations where ΔT exceeds $(\Delta)_c$ as determined above, buoyancy is assumed to dominate. The distance to final rise, in kilometers, is determined by the equivalent of a combination of Equations (48) and (59) in Briggs, (1975), p. 96):

$$x_f = 0.00207\ u(h)\ s^{-1/2} \tag{B12}$$

The plume height is determined by the equivalent of Equation (59) (Briggs, 1975, p. 96):

$$H = h' + 2.6 \left(\frac{F}{u(h)s}\right)^{1/3} \tag{B13}$$

The stable buoyancy rise for calm conditions (Briggs, 1975, pp. 81-82) is also evaluated:

$$H = h' + 4\ F^{1/4}\ s^{-3/8} \tag{B14}$$

The lowest value of these two obtained from Equations (B13) and (B14) is taken as the final effective height.

By setting equations (B13) and (B14) equal to each other and solving for u(h), the wind speed can be determined that yields the same plume rise for the wind conditions (B13) as does the calm equation. This rise is:

$$\begin{aligned} u(h) &= \left(\frac{2.6}{4}\right)^3\ F^{1/4}\ s^{1/8} \\ &= 0.2746\ F^{1/4}\ s^{1/8} \end{aligned} \tag{B15}$$

For wind speed less than or equal to this value, use equation (B14) for plume rise; for wind speeds greater than this value, use equation (B13).

Stable —— Momentum Rise

Where the stack gas temperature is less than or equal to the ambient air temperature, the assumption is made that the plume rise is dominated by momentum. If ΔT is less than $(\Delta T)_c$ as determined by (B11), the assumption is also made that the plume rise is dominated by momentum. The plume height is calculated from Equation (4.28) of Briggs (1969), p. 59):

$$H = h' + 1.5 \left(\frac{v_s{}^2 d^2 T}{4 T_s u(h)} \right)^{1/3} \qquad s^{-1/6} \qquad \text{(B16)}$$

The equation for unstable-neutral momentum rise (B9) is also evaluated. The lower result of these two equations is used as the resulting plume height.

All Conditions —— Distance Less Than Distance to Final Rise--(Gradual Rise)

Where gradual rise is to be estimated for unstable, neutral, or stable conditions, if the distance upwind from receptor to source x, in kilometers, is less than the distance to final rise, the equivalent of Equation (2) (Briggs, 1972, p. 1030) is used to determine plume height:

$$H = h' + \frac{160.\ F^{1/3}\ x^{\ 2/3}}{u(h)} \qquad \text{(B17)}$$

This height will be used only for buoyancy dominated conditions; should it exceed the final rise for the appropriate condition, the final rise is substituted instead.

REFERENCES -- APPENDIX B

Briggs, Gary A., 1969: *Plume Rise*, USAEC Critical Review Series, TID-25075, National Technical Information Service, Springfield, Va. 81 pp.

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Briggs, Gary A., 1972: Discussion on chimney plumes in neutral and stable surroundings. *Atmos. Environ.* *6*: 507-510.

Briggs, Gary A., 1973: *Diffusion Estimation for Small Emissions*. Atmos. Turb, and Diff. Lab., Contribution File No. (Draft) 79. Oak Ridge, Tenn. 59 pp.

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APPENDIX C

SOURCE PROGRAM LISTING

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```
C***   MPTER - VERSION 79365                                            MPT00010
C                                                                       MPT00020
C->->->-> SECTION A -  GENERAL REMARKS.                                 MPT00030
C                                                                       MPT00040
C***********************************************************************MPT00050
C        NOTE: THE CARD INPUT FOR SOURCES DIFFERS SLIGHTLY FROM         MPT00060
C                 PREVIOUS VERSIONS. ENDP SHOULD NOW BE INPUT TO        MPT00070
C                 INDICATE THE LAST OF THE POINT SOURCES.               MPT00080
C***********************************************************************MPT00090
C                                                                       MPT00100
C***   MPTER PROGRAM ABSTRACT.                                          MPT00110
C             MPTER IS A MULTIPLE POINT SOURCE CODE WITH AN OPTIONAL    MPT00120
C        TERRAIN ADJUSTMENT FEATURE.  THE ALGORITHM CODE IS PRIMARILY   MPT00130
C        BASED ON THE POINT SOURCE PORTION OF RAMR (RURAL VERSION OF    MPT00140
C        RAM) WHICH IS BASED ON GAUSSIAN MODELING ASSUMPTIONS.  THREE   MPT00150
C        OTHER FEATURES OF MPTER ARE: 1) TO TURN OFF STACK DOWNWASH,    MPT00160
C        2) TO TURN OFF GRADUAL PLUME RISE, AND 3) TO INCLUDE INITIAL   MPT00170
C        PLUME SIZE DEPENDENT ON PLUME RISE.                            MPT00180
C                                                                       MPT00190
C             EXECUTION OF MPTER IS LIMITED TO A MAXIMUM OF 250 POINT   MPT00200
C        SOURCES AND 180 RECEPTORS.  SIMULATION IS DONE HOUR-BY-HOUR    MPT00210
C        AND HOURLY METEOROLOGICAL DATA ARE REQUIRED AS INPUT.  LENGTH  MPT00220
C        OF SIMULATED TIME CAN VARY FROM 1 HOUR TO 1 YEAR.              MPT00230
C                                                                       MPT00240
C***   MPTER AUTHORS:                                                   MPT00250
C        THOMAS E. PIERCE* AND D. BRUCE TURNER*                         MPT00260
C        ENVIRONMENTAL OPERATIONS BRANCH                                MPT00270
C        METEOROLOGY AND ASSESSMENT DISISION, ESRL                      MPT00280
C        ENVIRONMENTAL PROTECTION AGENCY                                MPT00290
C                                                                       MPT00300
C        * ON ASSIGNMENT FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMIN.,  MPT00310
C          DEPARTMENT OF COMMERCE.                                      MPT00320
C                                                                       MPT00330
C***   MPTER SUPPORTED BY:                                              MPT00340
C        ENVIRONMENTAL OPERATIONS BRANCH                                MPT00350
C        MAIL DROP 80, EPA                                              MPT00360
C        RESRCH TRI PK, NC 27711                                        MPT00370
C                                                                       MPT00380
C        PHONE: (919) 541-4564,  FTS 629-4564.                          MPT00390
C                                                                       MPT00400
C     *****************************************************             MPT00410
C     *             IMPORTANT MESSAGE NO. 1 !!!              *          MPT00420
C     *        CALCULATIONS SUBMITTED TO SATISFY REGULATORY  *          MPT00430
C     *  REQUIREMENTS MAY REQUIRE CERTAIN PARAMETER VALUES   *          MPT00440
C     *  FOR WIND PROFILE POWER-LAW EXPONENTS AND TERRAIN    *          MPT00450
C     *  ADJUSTMENT FACTORS AND USE OF CERTAIN OPTIONS. CHECK *         MPT00460
C     *  WITH THE APPROPRIATE EPA REGIONAL OFFICE TO INSURE THAT *      MPT00470
C     *  ACCEPTABLE PARAMETER VALUES ARE USED IN YOUR RUN.   *          MPT00480
C     *****************************************************             MPT00490
C                                                                       MPT00500
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              MPTER - VERSION 79365

C***   TWO SYSTEMS OF LENGTH AND COORDINATES ARE USED IN MPTER:           MPT00510
C                                                                         MPT00520
C            THE FIRST SYSTEM, USER UNITS, IS SELECTED BY THE USER AND    MPT00530
C       NORMALLY USES THE COORDINATE SYSTEM OF THE EMISSION INVENTORY.    MPT00540
C       ALL LOCATIONS INPUT BY THE USER (SUCH AS SOURCES AND RECEPTORS)   MPT00550
C       ARE IN THIS SYSTEM. ALSO AS A CONVENIENCE TO THE USER, ALL        MPT00560
C       LOCATIONS ON OUTPUT ARE ALSO IN THIS SYSTEM.                      MPT00570
C                                                                         MPT00580
C            THE SECOND SYSTEM, X, Y, IS AN UPWIND, CROSSWIND             MPT00590
C       COORDINATE SYSTEM RELATIVE TO EACH RECEPTOR.  THE X-AXIS IS       MPT00600
C       DIRECTED UPWIND (SAME AS WIND DIRECTION FOR THE HOUR).  IN        MPT00610
C       ORDER TO DETERMINE DISPERSION PARAMETER VALUES AND EVALUATE       MPT00620
C       EQUATIONS FOR CONCENTRATION ESTIMATES, DISTANCES IN THIS          MPT00630
C       SYSTEM MUST BE IN KILOMETERS. THIS SYSTEM IS INTERNAL AND IS      MPT00640
C       NOT APPARENT TO THE USER.                                         MPT00650
C                                                                         MPT00660
C->->->-> SECTION 8 -  DATA INPUT LISTS.                                  MPT00670
C                                                                         MPT00680
C***   CARD VARIABLES AND FORMAT.                                         MPT00690
C            THE REQUIRED AND OPTIONAL CARD TYPES USED AS INPUT TO        MPT00700
C       MPTER ARE DESCRIBED BELOW:                                        MPT00710
C                                                                         MPT00720
C***   CARDS 1 - 3  ALPHANUMERIC DATA FOR TITLES. FORMAT(20A4)            MPT00730
C                                                                         MPT00740
C       LINE1 - 80 ALPHANUMERIC CHARACTERS.                               MPT00750
C       LINE2 - 80 ALPHANUMERIC CHARACTERS.                               MPT00760
C       LINE3 - 80 ALPHANUMERIC CHARACTERS.                               MPT00770
C                                                                         MPT00780
C***   CARD 4  CONTROL AND CONSTANTS.  FORMAT(FREE)                       MPT00790
C                                                                         MPT00800
C       IDATE(1) -  2-DIGIT YEAR FOR THIS RUN.                            MPT00810
C       IDATE(2) -  STARTING JULIAN DAY FOR THIS RUN.                     MPT00820
C       IHSTRT   -  STARTING HOUR FOR THIS RUN.                           MPT00830
C       NPER     -  NUMBER OF AVERAGING PERIODS TO BE RUN.                MPT00840
C       NAVG     -  NUMBER OF HOURS IN AN AVERAGING PERIOD.               MPT00850
C       IPOL     -  POLLUTANT INDICATOR: IS 1 FOR SO2, 2 FOR SUSPENDED    MPT00860
C                    PARTICULATE.                                         MPT00870
C       NSIGP    -  NUMBER OF SOURCES FROM WHICH CONC. CONTRIBUTIONS      MPT00880
C                    ARE DESIRED (MAX = 25).                              MPT00890
C       NAVS     -  ADDITIONAL AVERAGING TIME FOR HIGH-FIVE TABLE;        MPT00900
C                    MOST LIKELY EQUAL TO 2, 4, 6, OR 12.                 MPT00910
C       CONONE   -  MULTIPLIER TO CONVERT USER UNITS TO KILOMETERS.       MPT00920
C                      EXAMPLE MULTIPLIERS:                               MPT00930
C                        FEET TO KM    3.048E-04                          MPT00940
C                        MILES TO KM   1.609344                           MPT00950
C                        METERS TO KM  1.0E-03                            MPT00960
C       CELM     -  MULTIPLIER TO CONVERT USER HEIGHT UNITS TO METERS.    MPT00970
C                      EXAMPLE MULTIPLIER:                                MPT00980
C                        FEET TO METERS  0.3048                           MPT00990
C       HAFL     -  POLLUTANT HALF-LIFE, SECONDS. AN ENTRY OF ZERO WILL MPT01000
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C                    CAUSE SKIPPING OF POLLUTANT LOSS CALCULATIONS.    MPT01010
C                                                                      MPT01020
C     ***********************************************************     MPT01030
C     *          IMPORTANT MESSAGE NO. 2 !!!                    *     MPT01040
C     *      CALCULATIONS SUBMITTED TO SATISFY REGULATORY       *     MPT01050
C     *  REQUIREMENTS MAY REQUIRE THAT CERTAIN OPTIONS BE USED! *     MPT01060
C     *  CHECK WITH THE APPROPRIATE EPA REGIONAL OFFICE TO      *     MPT01070
C     *  INSURE THAT ACCEPTABLE OPTIONS ARE USED IN YOUR RUN.   *     MPT01080
C     ***********************************************************     MPT01090
C                                                                      MPT01100
C       ****************************************************          MPT01110
C       *      THE USER IS REFERRED TO THE USERS GUIDE FOR  *          MPT01120
C       *  MORE DETAILED INFORMATION ON OPTIONS. ESPECIALLY *          MPT01130
C       *  IMPORTANT IS AN UNDERSTANDING OF PRINTED OUTPUT  *          MPT01140
C       *  AND USE OF OPTIONS 9 THROUGH 19 TO DELETE UNNEEDED*         MPT01150
C       *  INFORMATION. MPTER IS CAPABLE OF GENERATING A    *          MPT01160
C       *  LARGE QUANTITY OF PRINTED INFORMATION UNLESS SOME *         MPT01170
C       *  OF THESE OPTIONS TO DELETE OUTPUT ARE USED       *          MPT01180
C       *  LIBERALLY.                                       *          MPT01190
C       ****************************************************          MPT01200
C                                                                      MPT01210
C                                                                      MPT01220
C                                                                      MPT01230
C** *   CARD 5.  OPTIONS.  FORMAT(FREE)                                MPT01240
C                                                                      MPT01250
C         1 = EMPLOY OPTION;  0 = DON'T USE OPTION.                    MPT01260
C                                                                      MPT01270
C       TECHNICAL OPTIONS:                                             MPT01280
C         IOPT(1)  -  USE TERRAIN ADJUSTMENTS.                         MPT01290
C         IOPT(2)  -  NO STACK DOWNWASH.                               MPT01300
C         IOPT(3)  -  NO GRADUAL PLUME RISE.                           MPT01310
C         IOPT(4)  -  USE BUOYANCY INDUCED DISPERSION.                 MPT01320
C                                                                      MPT01330
C       INPUT OPTIONS:                                                 MPT01340
C         IOPT(5)  -  MET. DATA IS ON CARDS.                           MPT01350
C         IOPT(6)  -  READ HOURLY EMISSIONS.                           MPT01360
C         IOPT(7)  -  SPECIFY SIGNIFICANT SOURCES.                     MPT01370
C         IOPT(8)  -  INPUT RADIAL DISTANCES AND GENERATE POLAR        MPT01380
C                       COORDINATE RECEPTORS.                          MPT01390
C                                                                      MPT01400
C       PRINTED OUTPUT OPTIONS:                                        MPT01410
C         IOPT(9)  -  DELETE EMISSIONS WITH HEIGHT TABLE.              MPT01420
C         IOPT(10) -  DELETE RESULTANT MET. DATA SUMMARY FOR AVG. PERIOD MPT01430
C         IOPT(11) -  DELETE HOURLY CONTRIBUTIONS.                     MPT01440
C         IOPT(12) -  DELETE MET. DATA ON HOURLY CONTRIBUTIONS.        MPT01450
C         IOPT(13) -  DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL  MPT01460
C                       RISE ON HOURLY CONTRIBUTIONS.                  MPT01470
C         IOPT(14) -  DELETE HOURLY SUMMARY.                           MPT01480
C         IOPT(15) -  DELETE MET. DATA ON HOURLY SUMMARY.              MPT01490
C         IOPT(16) -  DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL  MPT01500
C                       RISE ON HOURLY SUMMARY.
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C         IOPT(17) -  DELETE AVERAGING-PERIOD CONTRIBUTIONS.            MPT01510
C         IOPT(18) -  DELETE AVERAGING-PERIOD SUMMARY.                  MPT01520
C         IOPT(19) -  DELETE AVERAGE CONCENTRATIONS AND HIGH-FIVE TABLE. MPT01530
C                                                                       MPT01540
C       OTHER CONTROL AND OUTPUT OPTIONS:                               MPT01550
C         IOPT(20) -  RUN IS PART OF A SEGMENTED LONG RUN.              MPT01560
C         IOPT(21) -  WRITE PARTIAL CONCENTRATIONS TO DISK OR TAPE.     MPT01570
C         IOPT(22) -  WRITE HOURLY CONCENTRATIONS TO DISK OR TAPE.      MPT01580
C         IOPT(23) -  WRITE AVERAGING-PERIOD CONCS TO DISK OR TAPE.     MPT01590
C         IOPT(24) -  PUNCH AVERAGING-PERIOD CONCENTRATIONS ON CARDS.   MPT01600
C                                                                       MPT01610
C      ****************************************************************  MPT01620
C      *            IMPORTANT MESSAGE NO. 7 !!!                       *  MPT01630
C      *       CALCULATIONS SUBMITTED TO SATISFY REGULATORY           *  MPT01640
C      *  REQUIREMENTS MAY REQUIRE THAT CERTAIN PARAMETER VALUES      *  MPT01650
C      *  BE USED FOR THE VARIABLES ON THIS CARD.  CHECK WITH THE     *  MPT01660
C      *  APPROPRIATE EPA REGIONAL OFFICE TO INSURE THAT              *  MPT01670
C      *  ACCEPTABLE PARAMETER VALUES ARE USED IN YOUR RUN!           *  MPT01680
C      ****************************************************************  MPT01690
C                                                                       MPT01700
C***   CARD 6.  WIND AND TERRAIN. FORMAT(FREE)                          MPT01710
C                                                                       MPT01720
C         HANE       -  ANEMOMETER HEIGHT (METERS)                      MPT01730
C         PL(I),I=1,6 -  WIND SPEED POWER LAW PROFILE EXPONENTS FOR EACH MPT01740
C                          STABILITY.                                   MPT01750
C         CONTER(I),I=1,6 -  TERRAIN ADJUSTMENT FACTORS FOR EACH        MPT01760
C                              STABILITY.                               MPT01770
C                                                                       MPT01780
C***   CARD TYPE 7.  POINT SOURCE CARD.  FORMAT(3A4,8F8.2,F4.0)         MPT01790
C                                                                       MPT01800
C       (UP TO 250 POINT SOURCE CARDS ARE ALLOWED.)                     MPT01810
C         PNAME(I,NPT)I=1,3 -  12 CHARACTER SOURCE IDENTIFICATION.      MPT01820
C         SOURCE(1,NPT)  -  EAST COORDINATE OF POINT SOURCE (USER UNITS) MPT01830
C         SOURCE(2,NPT)  -  NORTH COORDINATE OF POINT SOURCE (USER UNITS)MPT01840
C         SOURCE(3,NPT)  -  SULFUR DIOXIDE EMISSION RATE (G/SEC).       MPT01850
C         SOURCE(4,NPT)  -  PARTICULATE EMISSION RATE (G/SEC).          MPT01860
C         SOURCE(5,NPT)  -  PHYSICAL STACK HEIGHT (METERS).             MPT01870
C         SOURCE(6,NPT)  -  STACK GAS TEMPERATURE (KELVIN).             MPT01880
C         SOURCE(7,NPT)  -  STACK INSIDE DIAMETER (METERS).             MPT01890
C         SOURCE(8,NPT)  -  STACK GAS EXIT VELOCITY (M/SEC).            MPT01900
C         ELP(NPT)       -  SOURCE GROUND-LEVEL ELEVATION (USER HT UNITS)MPT01910
C                                                                       MPT01920
C         CARD WITH 'ENDP' IN COLS 1-4 IS USED TO SIGNIFY THE           MPT01930
C           END OF THE POINT SOURCES.                                   MPT01940
C                                                                       MPT01950
C***   CARD TYPE 8.  SPECIFIED SIGNIFICANT SOURCES.  FORMAT(26I3)       MPT01960
C                                                                       MPT01970
C       (USED IF OPTION 7 = 1)                                          MPT01980
C         INPT           -  NUMBER OF USER SPECIFIED SIGNIFICANT SOURCES.MPT01990
C         MPS(I),I=1,NPT -  POINT SOURCE NUMBERS USER WANTS CONSIDERED  MPT02000
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C                               SIGNIFICANT.                                MPT02010
C                                                                           MPT02020
C***   CARD TYPE 9. MET. DATA IDENTIFIERS.  FORMAT(FREE)                    MPT02030
C                                                                           MPT02040
C       (USED IF OPTION 5 = 0)                                              MPT02050
C        ISFCD     -  SFC MET STATION IDENTIFIER       (5 DIGITS)           MPT02060
C        ISFCYR    -  YEAR OF SFC MET DATA             (2 DIGITS)           MPT02070
C        IMXD      -  UPPER-AIR STATION IDENTIFIER     (5 DIGITS)           MPT02080
C        IMXYR     -  YEAR OF MIXING HEIGHT DATA       (2 DIGITS)           MPT02090
C                                                                           MPT02100
C***   CARD TYPE 10. POLAR COORDINATE RECEPTORS.   FORMAT(FREE)             MPT02110
C                                                                           MPT02120
C       (USED IF OPTION 8 = 1)                                              MPT02130
C        RADIL(I),I= 1,5 -  ONE TO FIVE RADIAL DISTANCES (REST OF FIVE      MPT02140
C                           ARE ZEROS) EACH OF WHICH GENERATES 36           MPT02150
C                           RECEPTORS AROUND POINT CENTX, CENTY ON          MPT02160
C                           AZIMUTHS 10 TO 360 DEGREES. (USER UNITS)        MPT02170
C                            (USER UNITS)                                   MPT02180
C        CENTX     -  EAST COORDINATE ABOUT WHICH RADIALS ARE CENTERED.     MPT02190
C        CENTY     -  NORTH COORDINATE ABOUT WHICH RADIALS ARE CENTERED.    MPT02200
C                      (USER UNITS)                                         MPT02210
C                                                                           MPT02220
C***   CARD TYPE 11. POLAR COORDINATE RECEPTOR ELEVATIONS.                  MPT02230
C                                                                           MPT02240
C       FORMAT(I2,8X,5F10.0).  (USED IF OPTIONS 1 AND 8 ARE BOTH 1)         MPT02250
C        IDUM      -  AZIMUTH INDICATOR (1 TO 36)                           MPT02260
C        ELRDUM(I), I=1,5  -  RECEPTOR ELEVATIONS FOR THIS AZIMUTH FOR      MPT02270
C                            UP TO FIVE DISTANCES (USER HEIGHT UNITS).      MPT02280
C                                                                           MPT02290
C***   CARD TYPE 12.  RECEPTOR.  FORMAT(2A4,2F10.3,2F10.0)                  MPT02300
C                                                                           MPT02310
C       (UP TO 180 RECEPTORS MAY BE GENERATED INCLUDING POLAR COORDINATEMPT02320
C        ONES IF OPTION 8 = 1.)                                             MPT02330
C        RNAME(I),I=1,2 -  8 DIGIT ALPHANUMERIC STATION IDENTIFICATION.     MPT02340
C        RREC      -  EAST COORDINATE OF RECEPTOR (USER UNITS)              MPT02350
C        SREC      -  NORTH COORDINATE OF RECEPTOR (USER UNITS)             MPT02360
C        ZR        -  RECEPTOR HEIGHT ABOVE LOCAL GROUND-LEVEL (METERS)     MPT02370
C        ELR       -  RECEPTOR GROUND-LEVEL ELEVATION (USER HT UNITS)       MPT02380
C                                                                           MPT02390
C        CARD WITH 'ENDR' IN COLS 1-4 IS USED TO SIGNIFY THE END OF         MPT02400
C          THE RECEPTOR CARDS.                                              MPT02410
C                                                                           MPT02420
C***   CARD TYPE 13.  SEGMENTED RUN. FORMAT(FREE)                           MPT02430
C                                                                           MPT02440
C       (USED IF OPTION 20=1)                                               MPT02450
C        IDAY      -  NUMBER OF DAYS PREVIOUSLY PROCESSED.                  MPT02460
C        LDRUN     -  LAST DAY TO BE PROCESSED IN THIS RUN.                 MPT02470
C                                                                           MPT02480
C***   CARD TYPE 14.  METEOROLOGY.  FORMAT(FREE)                            MPT02490
C                                                                           MPT02500
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          C        (ONE CARD FOR EACH HOUR OF THE SIMULATION.)                   MPT02510
          C        (USED IF OPTION 5 = 1)                                        MPT02520
          C         JYR      -  YEAR OF MET DATA. (2 DIGITS)                     MPT02530
          C         DAY1     -  JULIAN DAY OF MET DATA.                          MPT02540
          C         JHR      -  HOUR OF MET DATA.                                MPT02550
          C         IKST     -  STABILITY CLASS FOR THIS HOUR.                   MPT02560
          C         QU       -  WIND SPEED FOR THIS HOUR (M/SEC).                MPT02570
          C         QTEMP    -  AMBIENT AIR TEMPERATURE FOR THIS HOUR (KELVIN).  MPT02580
          C         QTHETA   -  WIND DIRECTION FOR THIS HOUR (DEGREES AZIMUTH FROMMPT02590
          C                      WHICH THE WIND BLOWS).                          MPT02600
          C         QHL      -  MIXING HEIGHT FOR THIS HOUR (METERS).            MPT02610
          C                                                                      MPT02620
          C->->->-> SECTION C -  COMMON, DIMENSION, AND DATA STATEMENTS.         MPT02630
          C                                                                      MPT02640
          C           /EXPOS/  BETWEEN MAIN PROGRAM AND BLOCK DATA               MPT02650
   1             COMMON /EXPOS/ PXUCOF(6,9),PXUFXP(6,9),HC1(10)                  MPT02660
          C           /MPOR/ BETWEEN MAIN, PTR, OUTHR, AND RCP                   MPT02670
   2             COMMON /MPOR/ IOPT(25)                                          MPT02680
          C           /MPO/ BETWEEN MAIN, PTR, AND OUTHR                         MPT02690
   3             COMMON /MPO/ NRECEP,NAVG,NP,LH,NPT,IDATE(3),RREC(180),SREC(180),ZRMPT02700
                1(180),ELR(180),PHCHI(180),PHSIGS(180,26),HSAV(250),DSAV(250),PCHI(MPT02710
                2180),PSIGS(180,25),IPOL                                         MPT02720
          C           /MPR/  BETWEEN MAIN, PTR, AND RCP                          MPT02730
   4             COMMON /MPR/ UPL,Z,H,HL,X,Y,KST,DELH,SY,SZ,RC                   MPT02740
          C           /MP/  BETWEEN MAIN PROGRAM AND PTR                         MPT02750
   5             COMMON /MP/ SOURCE(9,250),CONTWO,PSAV(250),IPSIGS(250),U,TEMP,SINTMPT02760
                1,COST,PL(6),ELP(250),ELHN,HANE,TLOS,CELM,CTER                   MPT02770
          C           /MO/  BETWEEN MAIN PROGRAM AND OUTHR                       MPT02780
   6             COMMON /MO/ QTHETA(24),QU(24),IKST(24),QHL(24),QTEMP(24),MPS(25),NMPT02790
                1SIGP,IO,LINE1(20),LINE2(20),LINE3(20),RNAME(2,180),IRANK(180),STARMPT02800
                2(5,180)                                                         MPT02810
          C           /MR/  BETWEEN MAIN PROGRAM AND RANK                        MPT02820
   7             COMMON /MR/ HMAXA(5,180,5),NDAY(5,180,5),IHR(5,180,5),CONC(180,5),MPT02830
                1JDAY,NR                                                         MPT02840
          C                                                                      MPT02850
   8             DIMENSION PNAME(3,250), IFREQ(7), DUMR(24), HLH(2,24), IMPS(25), TMPT02860
                1ITLE(2), TABLE(2,21), CONTER(6), RADIL(5), ANAME(36)            MPT02870
   9             DIMENSION SUM(180), ELROUM(5), NTIME(5), ATIME(5)               MPT02880
          C                                                                      MPT02890
  10             DATA IFREQ /7*0/ ,BLNK /' '/                                    MPT02900
  11             DATA TITLE /'SO2 ','PART'/                                      MPT02910
  12             DATA ENDP /'ENDP'/ ,ENDR /'ENDR'/                               MPT02920
  13             DATA MAXP /250/ ,STR /'*'/ ,STAR /9000*' '/                     MPT02930
          C           MAXP EQUALS SECOND DIMENSION OF THE ARRAY NAMED SOURCE.    MPT02940
  14             DATA ANAME /' 10','  ',' 20','  ',' 30','  ',' 40','  ',' 50','  ',' 60','  ',' 70','  ',' 80',MPT02950
                1'  ',' 90','  ','100','  ','110','  ','120','  ','130','  ','140','  ','150','  ','160','  ','170','  ',MPT02960
                2180','  ','190','  ','200','  ','210','  ','220','  ','230','  ','240','  ','250','  ','260','  ','270MPT02970
                3','  ','280','  ','290','  ','300','  ','310','  ','320','  ','330','  ','340','  ','350','  ','360','/MPT02980
                4                                                                MPT02990
          C                                                                      MPT03000
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15    DATA NTIME /1,3,8,24,0/ ,ATIME /1.,3.,8.,24.,0./                  MPT03010
C                                                                       MPT03020
C->->->->SECTION D - FLOW DIAGRAM                                       MPT03030
C                                                                       MPT03040
C      RELATION OF SUBROUTINES IN MPTER                                 MPT03050
C                                                                       MPT03060
C                   MPTER                                               MPT03070
C                     !                                                 MPT03080
C                     ! * READ INPUT DATA                               MPT03090
C             --------! - LOOP FOR CALENDAR DAYS                        MPT03100
C             !       !                                                 MPT03110
C             !  -----! - LOOP FOR AVERAGING TIME                       MPT03120
C             !  !    !                                                 MPT03130
C             !  !    ! * READ MET DATA                                 MPT03140
C             !  !    ! * ANGARC                                        MPT03150
C             !  !    !                                                 MPT03160
C             !  !  --! - LOOP ON HOURS                                 MPT03170
C             !  !  ! !                                                 MPT03180
C             !  !  ! ! * * * * * PTR                                   MPT03190
C             !  !  ! !            !                                    MPT03200
C             !  !  ! !       ------ - LOOP ON RECEPTORS                MPT03210
C             !  !  ! !       !    !                                    MPT03220
C             !  !  ! !       !  --   - LOOP ON SOURCES                  MPT03230
C             !  !  ! !       !  ! !                                    MPT03240
C             !  !  ! !       !  ! ! * * RCP                            MPT03250
C             !  !  ! !       !  ! !      !                             MPT03260
C             !  !  ! !       !  ! !      **PGYZ                        MPT03270
C             !  !  ! !       !  ! !                                    MPT03280
C             !  !  ! !       !  --*                                    MPT03290
C             !  !  ! !       -----*                                    MPT03300
C             !  !  ! !                                                 MPT03310
C             !  !  ! ! * RANK                                          MPT03320
C             !  !  ! !                                                 MPT03330
C             !  !  ! ! * OUTHR                                         MPT03340
C             !  !  ! !                                                 MPT03350
C             !  !  --*                                                 MPT03360
C             !  !    !                                                 MPT03370
C             !  !    ! * OUTAVG (ENTRY POINT IN OUTHR)                 MPT03380
C             !  !    !                                                 MPT03390
C             !  -----*                                                 MPT03400
C             !       !                                                 MPT03410
C             --------*                                                 MPT03420
C                     !                                                 MPT03430
C                    EXIT                                               MPT03440
C                                                                       MPT03450
C->->->->SECTION E - RUN SET-UP AND READ FIRST 6 INPUT CARDS.           MPT03460
C                                                                       MPT03470
C         INITIALIZATIONS............                                   MPT03480
C         THE FOLLOWING 18 STATEMENTS MAY BE DELETED FOR USE ON         MPT03490
C         COMPUTERS THAT ZERO CORE LOCATIONS USED BY A PROBLEM          MPT03500
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00351*                C       PRIOR TO EXECUTION.                                                  MPT03510
00352*        16            NRECEP=0                                                               MPT03520
00353*        17            NP=0                                                                   MPT03530
00354*        18            NHR=0                                                                  MPT03540
00355*        19            NP3=0                                                                  MPT03550
00356*        20            NP8=0                                                                  MPT03560
00357*        21            NP24=0                                                                 MPT03570
00358*        22            NPX=0                                                                  MPT03580
00359*        23            DO 10 I=1,21                                                           MPT03590
00360*        24            TABLE(1,I)=0.                                                          MPT03600
00361*        25      10    TABLE(2,I)=0.                                                          MPT03610
00362*        26            DO 40 I=1,180                                                          MPT03620
00363*        27            SUM(I)=0.                                                              MPT03630
00364*        28            DO 30 J=1,5                                                            MPT03640
00365*        29            CONC(I,J)=0.                                                           MPT03650
00366*        30            DO 20 K=1,5                                                            MPT03660
00367*        31      20    HMAXA(J,I,K)=0.                                                        MPT03670
00368*        32      30    CONTINUE                                                               MPT03680
00369*        33      40    CONTINUE                                                               MPT03690
00370*                C       I/O DEVICE INITIALIZATIONS                                           MPT03700
00371*        34            IN=5                                                                   MPT03710
00372*        35            IO=6                                                                   MPT03720
00373*                C       UNIT 11 - DISK INPUT OF MET DATA--USED WHEN IOPT(5)=1.               MPT03730
00374*                C       UNIT 10 - DISK OUPUT OF PARTIAL CONCENTRATIONS                       MPT03740
00375*                C        AT EACH RECEPTOR--USED WHEN IOPT(21) = 1.                           MPT03750
00376*                C       UNIT 12 TAPE/DISK OUTPUT OF HRLY CONCENTRATIONS- IF IOPT(22)=1.      MPT03760
00377*                C       UNIT 13 TAPE/DISK OUTPUT OF CONCENTRATIONS FOR AVERAGING PERIODMPT03770
00378*                C          USED IF IOPT(23) = 1.                                             MPT03780
00379*                C       UNIT 14 TAPE/DISK STORAGE FOR SUMMARY INFO, USED IF IOPT(20)=1.MPT03790
00380*                C       UNIT 15 - TAPE/DISK INPUT OF HOURLY POINT SOURCE EMISSIONS           MPT03800
00381*                C         — USED IF IOPT(6) = 1.                                             MPT03810
00382*                C                                                                            MPT03820
00383*                C       READ CARDS 1-3  (SEE DESCRIPTION, SECTION B).                        MPT03830
00384*                C                                                                            MPT03840
00385*        36            READ (IN,1500) LINE1,LINE2,LINE3                                       MPT03850
00386*        37            WRITE (IO,1400) LINE1,LINE2,LINE3                                      MPT03860
00387*                C                                                                            MPT03870
00388*                C       READ CARD TYPE 4  (SEE DESCRIPTION, SECTION B).                      MPT03880
00389*                C                                                                            MPT03890
00390*        38            READ (IN, *  ) IDATE(1),IDATE(2),IHSTRT,NPER,NAVG,IPOL,NSIGP,NAV5,MPT03900
00391*                     1CONONE,CELM,HAFL                                                       MPT03910
00392*                C       THE ABOVE FORMAT IS UNIVACS FREE FIELD INPUT.                        MPT03920
00393*                C       VARIABLES MUST BE SEPARATED BY COMMAS.                               MPT03930
00394*                C       THIS IS SIMILAR TO IBM'S LIST DIRECTED IO.                           MPT03940
00395*        39            IF (NSIGP.LE.25) GO TO 50                                              MPT03950
00396*        40            WRITE (IO,1250) NSIGP                                                  MPT03960
00397*        41            STOP                                                                   MPT03970
00398*        42      50    IP=IPOL-2                                                              MPT03980
00399*        43            CONTWO=CONONE                                                          MPT03990
00400*                C                                                                            MPT04000
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MPTER - VERSION 79365

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00401*            C          ************************************************      MPTO4010
00402*            C          *      SEE IMPORTANT  MESSAGE                  *      MPTO4020
00403*            C          *              NUMBER 2 ABOVE!                 *      MPTO4030
00404*            C          ************************************************      MPTO4040
00405*            C                                                                MPTO4050
00406*            C          READ CARD TYPE 5  (SEE DESCRIPTION, SECTION B).       MPTO4060
00407*            C                                                                MPTO4070
00408*      44            READ (IN, *  ) (IOPT(I),I=1,24)                          MPTO4080
00409*            C             WRITE GENERAL INPUT INFORMATION                    MPTO4090
00410*      45            WRITE (IO,1410) TITLE(IP),NPER,NAVG,IHSTRT,IDATE(2),IDATE (1),CONTWMPTO4100
00411*                   1O,NSIGP                                                  MPTO4110
00412*      46            DAYIA=IDATE(2)                                           MPTO4120
00413*      47            HR1=IHSTRT                                               MPTO4130
00414*      48            IF (HAFL.GT.0.0) GO TO 60                                MPTO4140
00415*      49            WRITE (IO,1420)                                          MPTO4150
00416*      50            GO TO 70                                                 MPTO4160
00417*      51       60   WRITE (IO,1430) HAFL                                     MPTO4170
00418*      52            TLOS=693./HAFL                                           MPTO4180
00419*      53       70   IF (IOPT(19).EQ.1) GO TO 80                              MPTO4190
00420*      54            NAVT=5                                                   MPTO4200
00421*      55            IF (NAV5.EQ.1.OR.NAV5.EQ.3.OR.NAV5.EQ.8.OR.NAV5.EQ.24.OR.NAV5.EQ.0MPTO4210
00422*                   1) NAVT=4                                                 MPTO4220
00423*      56            NTIME(5)=NAV5                                            MPTO4230
00424*      57            ATIME(5)=NAV5                                            MPTO4240
00425*      58            WRITE (IO,1440) NAVT                                     MPTO4250
00426*      59       80   IF (IOPT(1).EQ.0) GO TO 90                               MPTO4260
00427*      60            WRITE (IO,1450) CELW                                     MPTO4270
00428*      61            ELHN=99999.                                              MPTO4280
00429*      62            ELOW=99999.                                              MPTO4290
00430*      63       90   IF (NSIGP.GT.0) GO TO 100                                MPTO4300
00431*      64            IOPT(11)=1                                               MPTO4310
00432*      65            IOPT(17)=1                                               MPTO4320
00433*      66      100   WRITE (IO,1460) (I,IOPT(I),I=1,13)                       MPTO4330
00434*      67            WRITE (IO,1470) (I,IOPT(I),I=14,24)                      MPTO4340
00435*            C                                                                MPTO4350
00436*            C          ************************************************      MPTO4360
00437*            C          *    SEE IMPORTANT MESSAGE NO. 3 ABOVE          *      MPTO4370
00438*            C          ************************************************      MPTO4380
00439*            C                                                                MPTO4390
00440*            C          READ CARD TYPE 6 (SEE DESCRIPTION, SECTION B).        MPTO4400
00441*            C                                                                MPTO4410
00442*      68            READ (IN, *  ) HANE,PL,CONTER                            MPTO4420
00443*      69            IF (IOPT(1).EQ.1) GO TO 110                              MPTO4430
00444*      70            WRITE (IO,1480) HANE,PL                                  MPTO4440
00445*      71            GO TO 140                                                MPTO4450
00446*      72      110   WRITE (IO,1490) HANE,PL,CONTER                           MPTO4460
00447*      73            DO 120 I=1,6                                             MPTO4470
00448*      74            IF (CONTER(I).LT.0..OR.CONTER(I).GT.1.) GO TO 130        MPTO4480
00449*      75      120   CONTINUE                                                 MPTO4490
00450*      76            GO TO 140                                                MPTO4500
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  130 WRITE (IO,1260)                                                   MPT04510
      STOP                                                              MPT04520
C                                                                       MPT04530
C        MUCH OF THE FOLLOWING PROGRAM SECTION IS BASED UPON            MPT04540
C        RAMQ IN THE RAM SYSTEM. THIS SECTION IS RESPONSIBLE            MPT04550
C        FOR MAKING THE NECESSARY DATA CONVERSIONS ON THE RAW           MPT04560
C        EMISSIONS DATA IN ORDER TO ESTABLISH A STANDARD                MPT04570
C        DATA BANK WHICH WILL BE ACCEPTABLE. A CONVERSION FACTOR        MPT04580
C        FROM USER UNITS TO KILOMETERS IS APPLIED WHEN NECESSARY.       MPT04590
C                                                                       MPT04600
C->->->->SECTION F - INPUT AND PROCESS EMISSION INFORMATION.            MPT04610
C                                                                       MPT04620
  140 WRITE (IO,1500)                                                   MPT04630
      NPT=0                                                             MPT04640
C        BEGIN LOOP TO READ THE POINT SOURCE INFORMATION                MPT04650
  150 NPT=NPT+1                                                         MPT04660
      IF (NPT.LE.MAXP) GO TO 160                                        MPT04670
      READ (IN,1200) DUM                                                MPT04680
      IF (DUM.EQ.ENDP) GO TO 230                                        MPT04690
      WRITE (IO,1270) MAXP                                              MPT04700
      STOP                                                              MPT04710
C                                                                       MPT04720
C        READ CARD TYPE 7  (SEE DESCRIPTION, SECTION B).                MPT04730
C                                                                       MPT04740
  160 READ (IN,1210) (PNAME(I,NPT),I=1,3),(SOURCE(I,NPT),I=1,8),ELP(NPT)MPT04750
C        CARD WITH   'ENDP'   IN COL 1-10 IS USED TO SIGNIFY END OF     MPT04760
C        POINT SOURCES.                                                 MPT04770
      IF (PNAME(1,NPT).EQ.ENDP) GO TO 230                               MPT04780
C        ELHN, ELEVATION OF LOWEST STACK TOP IN INVENTORY, IS DETERMINEDMPT04790
C        IN USER HEIGHT UNITS                                           MPT04800
      IF (IOPT(1).EQ.0) GO TO 170                                       MPT04810
      TOM=SOURCE(5,NPT)/CELM+ELP(NPT)                                   MPT04820
      IF (TOM.LT.ELHN) ELHN=TOM                                         MPT04830
C        LOWPT, ELEVATION OF LOWEST SOURCE GROUND-LEVEL                 MPT04840
C         IN INVENTORY, IN USER HEIGHT UNITS.                           MPT04850
      IF (ELP(NPT).LT.ELOW) ELOW=ELP(NPT)                               MPT04860
C        CALCULATE BUOYANCY FACTOR                                      MPT04870
  170 D=SOURCE(7,NPT)                                                   MPT04880
C         FOLLOWING VARIABLE IS BRIGGS' F WITHOUT TEMPERATURE FACTOR.   MPT04890
      SOURCE(9,NPT)=2.45153*SOURCE(8,NPT)*D*D                           MPT04900
C        2.45153 IS GRAVITY OVER FOUR.                                  MPT04910
      TS=SOURCE(6,NPT)                                                  MPT04920
      IF (TS.GT.293.) GO TO 180                                         MPT04930
      HE=SOURCE(5,NPT)                                                  MPT04940
      GO TO 200                                                         MPT04950
  180 F=SOURCE(9,NPT)*(TS-293.)/TS                                      MPT04960
      IF (F.GE.55.) GO TO 190                                           MPT04970
C        ONLY BUOYANCY PLUME RISE IS CONSIDERED HERE.                   MPT04980
      HE=SOURCE(5,NPT)+21.425*F**0.75/3.                                MPT04990
      GO TO 200                                                         MPT05000
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00501*      103   190   HF=SOURCE(5,NPT)+38.71*F**0.6/3.                                  MPT05010
00502*              C      HSAV, DSAV, AND PSAV ARE USED FOR TEMPORARY STORAGE            MPT05020
00503*              C      (OR AS DUMMIES) FOR THE NEXT 60 STATEMENTS.                    MPT05030
00504*      104   200   HSAV(NPT)=HF                                                      MPT05040
00505*             C        DETERMINE HEIGHT INDEX.                                       MPT05050
00506*      105         DO 210 IH=2,9                                                     MPT05060
00507*      106         IF (HF.LT.(HC1(IH)-.01)) GO TO 220                                MPT05070
00508*      107   210   CONTINUE                                                          MPT05080
00509*      108         IH=10                                                             MPT05090
00510*      109   220   IS=IH-1                                                           MPT05100
00511*      110         A=PXUCOF(2,IS)                                                    MPT05110
00512*      111         B=PXUEXP(2,IS)                                                    MPT05120
00513*      112         DSAV(NPT)=(A*HF**B)*SOURCE(IPOL,NPT)/3.                           MPT05130
00514*             C       AN ESTIMATE OF THE POTENTIAL IMPACT OF EACH SOURCE IS          MPT05140
00515*             C        DETERMINED AND STORED IN DSAV. MAX CONCENTRATION IS           MPT05150
00516*             C        DETERMINED BY CHI(MAX)=(A*H**B)*Q/U WHERE                     MPT05160
00517*             C        A IS THE COEFFICENT AND B IS THE EXPONENT, OF                 MPT05170
00518*             C        MAXIMUM CHI*U/Q VALUES PREDETERMINED FOR B STABILITY          MPT05180
00519*             C        AND A SPECIFIC EFFECTIVE HEIGHT RANGE. PLUME RISE             MPT05190
00520*             C        IS CALCULATED FOR B STABILITY AND 3 M/SEC WIND SPEED.         MPT05200
00521*             C                                                                      MPT05210
00522*             C       GO BACK AND READ DATA FOR ANOTHER POINT SOURCE.                MPT05220
00523*      113         IPSIGS(NPT)=0                                                     MPT05230
00524*             C       LIST POINT SOURCE INFORMATION.                                 MPT05240
00525*      114         WRITE (IO,1510) NPT,(PNAME(J,NPT),J=1,3),(SOURCE(K,NPT),K=1,8),DSAMPT05250
00526*                 1V(NPT),HSAV(NPT),ELP(NPT),F                                      MPT05260
00527*      115         GO TO 150                                                         MPT05270
00528*      116   230   NPT=NPT-1                                                         MPT05280
00529*             C         CHECK FOR NPT < OR = 0                                       MPT05290
00530*      117         IF (NPT.GT.0) GO TO 240                                           MPT05300
00531*      118         WRITE (IO,1280) NPT                                               MPT05310
00532*      119         STOP                                                              MPT05320
00533*             C                                                                      MPT05330
00534*             C->->->->SECTION G - RANK SIGNIFICANT SOURCES.                         MPT05340
00535*             C                                                                      MPT05350
00536*      120   240   IF (NSIGP.EQ.0) GO TO 280                                         MPT05360
00537*             C         RANK NSIGP HIGHEST POINT SOURCES.                            MPT05370
00538*      121         IF (NPT.LT.NSIGP) NSIGP=NPT                                       MPT05380
00539*      122         DO 260 I=1,NSIGP                                                  MPT05390
00540*      123         SIGMAX=-1.0                                                       MPT05400
00541*      124         DO 250 J=1,NPT                                                    MPT05410
00542*      125         IF (DSAV(J).LE.SIGMAX) GO TO 250                                  MPT05420
00543*      126         SIGMAX=DSAV(J)                                                    MPT05430
00544*      127         LMAX=J                                                            MPT05440
00545*      128   250   CONTINUE                                                          MPT05450
00546*             C         IMPS IS THE SOURCE NUMBER IN ORDER OF SIGNIFICANCE.          MPT05460
00547*      129         IMPS(I)=LMAX                                                      MPT05470
00548*             C         PSAV IS THE CALC. CONC. IN ORDER OF SIGNIFICANCE.            MPT05480
00549*      130         PSAV(I)=SIGMAX                                                    MPT05490
00550*      131   260   DSAV(LMAX)=-1.0                                                   MPT05500
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00551*              C        OUTPUT TABLE OF RANKED SOURCES.                               MPT05510
00552*      132            WRITE (IO,1520) TITLE(IP)                                       MPT05520
00553*      133            DO 270 I=1,NSIGP                                                MPT05530
00554*      134            WRITE (IO,1530) I,PSAV(I),IMPS(I)                               MPT05540
00555*      135     270    CONTINUE                                                        MPT05550
00556*              C                                                                      MPT05560
00557*              C->->->->SECTION H - EMISSIONS WITH HEIGHT TABLE.                      MPT05570
00558*              C                                                                      MPT05580
00559*      136     280    IF (IOPT(9).EQ.1) GO TO 340                                     MPT05590
00560*      137            DO 320 I=1,NPT                                                  MPT05600
00561*      138            DO 290 J=1,20                                                   MPT05610
00562*      139            HC=J*5.                                                         MPT05620
00563*      140            IF (SOURCE(5,I).LE.HC) GO TO 300                                MPT05630
00564*      141     290    CONTINUE                                                        MPT05640
00565*              C        POINT SOURCES WITH PHYSICAL HEIGHTS GT 100 METERS ARE LISTED  MPT05650
00566*              C        SEPARATELY.                                                   MPT05660
00567*      142            WRITE (IO,1540) I,SOURCE(5,I),SOURCE(IPOL,I)                    MPT05670
00568*      143            GO TO 310                                                       MPT05680
00569*              C        ADD EMISSION RATE INTO TABLE AND TOTAL.                       MPT05690
00570*      144     300    TABLE(1,J)=TABLE(1,J)+SOURCE(IPOL,I)                            MPT05700
00571*      145     310    TABLE(1,21)=TABLE(1,21)+SOURCE(IPOL,I)                          MPT05710
00572*      146     320    CONTINUE                                                        MPT05720
00573*              C        OUTPUT SOURCE-STRENGTH-HEIGHT TABLE                           MPT05730
00574*              C        THIS TABLE DISPLAYS THE TOTAL EMISSIONS FOR POINT             MPT05740
00575*              C        SOURCES AND THE CUMULATIVE FREQUENCY ACCORDING TO             MPT05750
00576*              C        HEIGHT CLASS                                                  MPT05760
00577*      147            WRITE (IO,1550) TITLE(IP)                                       MPT05770
00578*              C        HEIGHT CLASS EMISSIONS ARE IN 1                               MPT05780
00579*              C        DETERMINE CUMULATIVE PERCENT IN 2                             MPT05790
00580*      148            IH1=0                                                           MPT05800
00581*      149            IH2=5                                                           MPT05810
00582*      150            IM1=1                                                           MPT05820
00583*      151            TABLE(2,1)=TABLE(1,1)/TABLE(1,21)                               MPT05830
00584*      152            WRITE (IO,1560) IH1,IH2,(TABLE(J,1),J=1,2)                      MPT05840
00585*      153            DO 330 I=2,20                                                   MPT05850
00586*      154            IH2=I*5                                                         MPT05860
00587*      155            IH1=IH2-4                                                       MPT05870
00588*      156            IM1=I-1                                                         MPT05880
00589*      157            TABLE(2,I)=TABLE(1,I)/TABLE(1,21)+TABLE(2,IM1)                  MPT05890
00590*      158            WRITE (IO,1560) IH1,IH2,(TABLE(J,I),J=1,2)                      MPT05900
00591*      159     330    CONTINUE                                                        MPT05910
00592*      160            WRITE (IO,1570) TABLE(1,21)                                     MPT05920
00593*              C                                                                      MPT05930
00594*              C->->->->SECTION I - EXECUTE FOR INPUT OF SIGNIFICANT SOURCE NUMBERS.  MPT05940
00595*              C                                                                      MPT05950
00596*      161     340    WRITE (IO,1580)                                                 MPT05960
00597*      162            IF (IOPT(7).EQ.0) GO TO 370                                     MPT05970
00598*              C                                                                      MPT05980
00599*              C        READ CARD TYPE 8 (SEE DESCRIPTION, SECTION 8).                MPT05990
00600*              C                                                                      MPT06000
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00601*      163          READ (IN,1220) INPT,(MPS(I),I=1,INPT)                          MPT06010
00602*      164          WRITE (IO,1590) INPT,(MPS(I),I=1,INPT)                         MPT06020
00603*      165          IF (INPT.LE.NSIGP) GO TO 350                                   MPT06030
00604*      166          WRITE (IO,1290) INPT,NSIGP                                     MPT06040
00605*      167          STOP                                                           MPT06050
00606*      168    350   IF (INPT.EQ.0) GO TO 370                                       MPT06060
00607*      169          IF (MPS(INPT).EQ.0) WRITE (IO,1300)                            MPT06070
00608*      170          J=INPT+1                                                       MPT06080
00609*      171          K=1                                                            MPT06090
00610*           C          ADD SIGNIFICANT SOURCES DETERMINED FROM RANKED SOURCE LIST  MPT06100
00611*           C          IF NSIGP GREATER THAN INPT.                                 MPT06110
00612*      172          IF (J.GT.NSIGP) GO TO 390                                      MPT06120
00613*      173          DO 360 I=J,NSIGP                                               MPT06130
00614*      174          MPS(I)=IMPS(K)                                                 MPT06140
00615*      175    360   K=K+1                                                          MPT06150
00616*      176          GO TO 390                                                      MPT06160
00617*      177    370   DO 380 I=1,NSIGP                                               MPT06170
00618*      178    380   MPS(I)=IMPS(I)                                                 MPT06180
00619*      179    390   WRITE (IO,1600) NPT,NSIGP,(MPS(I),I=1,NSIGP)                   MPT06190
00620*      180          IF (IOPT(4).EQ.0) GO TO 410                                    MPT06200
00621*           C          SAVE AVERAGE EMISSION RATE                                  MPT06210
00622*      181          DO 400 I=1,NPT                                                 MPT06220
00623*      182    400   PSAV(I)=SOURCE(IPOL,I)                                         MPT06230
00624*           C          FILL IN SIGNIFICANT POINT SOURCE ARRAY                      MPT06240
00625*      183    410   DO 420 I=1,NSIGP                                               MPT06250
00626*      184          J=MPS(I)                                                       MPT06260
00627*      185    420   IPSIGS(J)=I                                                    MPT06270
00628*           C                                                                      MPT06280
00629*           C->->->->SECTION J - CHECK MET DATA IF FROM FILE OF ONE YEAR'S DATA.   MPT06290
00630*           C                                                                      MPT06300
00631*      186          IF (IOPT(5).EQ.1) GO TO 450                                    MPT06310
00632*           C                                                                      MPT06320
00633*           C          READ CARD TYPE 9 (SEE DESCRIPTION, SECTION 9).              MPT06330
00634*           C                                                                      MPT06340
00635*      187          READ (IN,*   ) ISFCD,ISFCYR,IMXD,IMXYR                         MPT06350
00636*           C          READ ID RECORD FROM PREPROCESSED MET DISK OR TAPE FILE.     MPT06360
00637*      188          READ (11) ID,IYEAR,IDM,IYM                                     MPT06370
00638*      189          IF (ISFCD.EQ.ID.AND.ISFCYR.EQ.IYEAR) GO TO 430                 MPT06380
00639*      190          WRITE (IO,1310) ISFCD,ISFCYR,ID,IYEAR                          MPT06390
00640*      191          STOP                                                           MPT06400
00641*      192    430   IF (IMXD.EQ.IDM.AND.IMXYR.EQ.IYM) GO TO 440                    MPT06410
00642*      193          WRITE (IO,1320) IMXD,IMXYR,IDM,IYM                             MPT06420
00643*      194          STOP                                                           MPT06430
00644*      195    440   WRITE (IO,1410) ISFCD,ISFCYR,IMXD,IMXYR                        MPT06440
00645*           C                                                                      MPT06450
00646*           C->->->->SECTION K - GENERATE POLAR COORDINATE RECEPTORS.              MPT06460
00647*           C                                                                      MPT06470
00648*      196    450   NRECEP=0                                                       MPT06480
00649*      197          WRITE (IO,1620)                                                MPT06490
00650*      198          IF (IOPT(9).NE.1) GO TO 520                                    MPT06500
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                 C                                                                  MPT06510
                 C        READ CARD TYPE 10 (SEE DESCRIPTION, SECTION 8).          MPT06520
                 C                                                                  MPT06530
      199              READ (IN, *  ) RADIL,CENTX,CENTY                             MPT06540
      200              JA=0                                                         MPT06550
      201              DO 460 J=1,5                                                 MPT06560
      202              IF (RADIL(J).EQ.0) GO TO 460                                 MPT06570
      203              JA=JA+1                                                      MPT06580
      204        460   CONTINUE                                                     MPT06590
      205              WRITE (IO,1630) CENTX,CENTY,RADIL                            MPT06600
      206              DO 480 I=1,36                                                MPT06610
                 C           CALCULATE THE ANGLE IN RADIANS                         MPT06620
      207              RADIK=FLOAT(I)*0.1745329                                     MPT06630
                 C        0.1745329 IS 2*PI/36                                      MPT06640
      208              SINRAD=SIN(RADIK)                                            MPT06650
      209              COSRAD=COS(RADIK)                                            MPT06660
      210              DO 470 J=1,JA                                                MPT06670
      211              NRECEP=I+36*(J-1)                                            MPT06680
      212              RREC(NRECEP)=(RADIL(J)*SINRAD)+CENTX                         MPT06690
                 C           CALCULATE THE EAST-COORDINATE                          MPT06700
      213              SREC(NRECEP)=(RADIL(J)*COSRAD)+CENTY                         MPT06710
                 C           CALCULATE THE NORTH-COORDINATE                         MPT06720
      214              RNAME(1,NRECEP)=ANAME(I)                                     MPT06730
                 C           ALPHANUMERIC INFORMATION WHICH INDICATES DEGREES AZIMUTH MPT06740
      215              ENCODE (4,1680,RNAME(2,NRECEP)) RADIL(J)                     MPT06750
                 C           ENCODE THE FLOATING POINT VARIABLE OF RADIAL DISTANCE  MPT06760
                 C           TO ALPHANUMERIC REPRESENTATION SO INFO CAN BE PRINTED  MPT06770
      216              ZR(NRECEP)=0.                                                MPT06780
      217              ELR(NRECEP)=0.                                               MPT06790
      218        470   CONTINUE                                                     MPT06800
      219        480   CONTINUE                                                     MPT06810
      220              NRECEP=36*JA                                                 MPT06820
                 C                                                                  MPT06830
                 C->->->->SECTION L - READ POLAR COORDINATE ELEVATIONS.            MPT06840
                 C                                                                  MPT06850
      221              IF (IOPT(1).EQ.0) GO TO 520                                  MPT06860
                 C                                                                  MPT06870
                 C        READ 36 CARDS, TYPE 11 (SEE DESCRIPTION, SECTION 8).     MPT06880
                 C                                                                  MPT06890
      222              DO 510 I=1,36                                                MPT06900
      223              READ (IN,1270) IDUM,(ELRDUM(J),J=1,JA)                       MPT06910
      224              IF (IDUM.EQ.I) GO TO 490                                     MPT06920
      225              WRITE (IO,1770) I,IDUM                                       MPT06930
      226              STOP                                                         MPT06940
      227        490   DO 500 J=1,JA                                                MPT06950
      228              K=J-1                                                        MPT06960
      229              L=K*36+I                                                     MPT06970
      230        500   ELR(L)=ELRDUM(J)                                             MPT06980
      231        510   CONTINUE                                                     MPT06990
                 C                                                                  MPT07000
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00701*              C->->->->SECTION M - READ AND PROCESS RECEPTOR INFORMATION.           MPT07010
00702*              C                                                                     MPT07020
00703*              C          NOW READ CARD TYPE 12 IF NECESSARY. MUST HAVE A CARD WITH  MPT07030
00704*              C          'ENDR' IN COLS 1-4 TO INDICATE END OF RECEPTOR CARDS.      MPT07040
00705*              C          NO MORE THAN 180 RECEPTORS CAN BE INPUT TO MPTER.          MPT07050
00706*              C        START LOOP TO ENTER RECEPTORS.                               MPT07060
00707*      232     520   NRECEP=NRECEP+1                                                 MPT07070
00708*      233           IF (NRECEP.LE.180) GO TO 540                                    MPT07080
00709*      234           READ (IN,1200,END=530) DUM                                      MPT07090
00710*      235           IF (DUM.EQ.ENDR) GO TO 550                                      MPT07100
00711*      236     530   WRITE (IO,1340)                                                 MPT07110
00712*      237           STOP                                                            MPT07120
00713*              C                                                                     MPT07130
00714*              C        READ CARD TYPE 12 (SEE DESCRIPTION, SECTION B).              MPT07140
00715*              C                                                                     MPT07150
00716*      238     540   READ (IN,1240) (RNAME(J,NRECEP),J=1,2),RREC(NRECEP),SREC(NRECEP),ZMPT07160
00717*                   1R(NRECEP),ELR(NRECEP)                                           MPT07170
00718*              C        PLACE 'ENDR' IN COLS 1 TO 4 ON CARD FOLLOWING LAST RECEPTOR  MPT07180
00719*              C        TO END READING TYPE 12 CARDS.                                MPT07190
00720*      239           IF (RNAME(1,NRECEP).EQ.ENDR) GO TO 550                          MPT07200
00721*      240           GO TO 520                                                       MPT07210
00722*      241     550   NRECEP=NRECEP-1                                                 MPT07220
00723*      242           IF (IOPT(1).EQ.0) GO TO 570                                     MPT07230
00724*              C        IF TERRAIN OPTION IS EMPLOYED, DETERMINE IF                  MPT07240
00725*              C         RECEPTOR ELEVATIONS REQUIRE LABELING WITH ASTERISKS         MPT07250
00726*              C         FOR ADDITIONAL REMARKS.                                     MPT07260
00727*      243           DO 560 J=1,NRECEP                                               MPT07270
00728*      244           IF (ELR(J).GT.ELHN.OR.ELR(J).LT.ELOW) STAR(2,J)=STR             MPT07280
00729*      245           IF (ELR(J).GT.ELHN) STAR(1,J)=STR                               MPT07290
00730*      246     560   CONTINUE                                                        MPT07300
00731*      247     570   IF (NRECEP.GT.0) GO TO 580                                      MPT07310
00732*      248           WRITE (IO,1350) NRECEP                                          MPT07320
00733*      249           STOP                                                            MPT07330
00734*              C        PRINT OUT TABLE OF RECEPTORS. ***                            MPT07340
00735*      250     580   WRITE (IO,1650)                                                 MPT07350
00736*      251           DO 590 K=1,NRECEP                                               MPT07360
00737*      252     590   WRITE (IO,1660) K,STAR(1,K),STAR(2,K),(RNAME(J,K),J=1,2),RREC(K),SMPT07370
00738*                   1REC(K),ZR(K),ELR(K)                                             MPT07380
00739*      253           IF (IOPT(1).EQ.0) GO TO 600                                     MPT07390
00740*      254           WRITE (IO,1670)                                                 MPT07400
00741*              C                                                                     MPT07410
00742*              C->->->->SECTION N - POSITION FILES AS REQUIRED.                      MPT07420
00743*              C                                                                     MPT07430
00744*      255     600   IF (IOPT(20).EQ.0) GO TO 610                                    MPT07440
00745*              C                                                                     MPT07450
00746*              C        READ CARD TYPE 13 (SEE DESCRIPTION, SECTION B).              MPT07460
00747*              C                                                                     MPT07470
00748*      256           READ (IN,*  ) IDAY,LDRUN                                        MPT07480
00749*      257           WRITE (IO,1690) IDAY,LDRUN                                      MPT07490
00750*      258           IF (IDAY.EQ.0) GO TO 610                                        MPT07500
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00751*                C       READ INFO FOR HIGH-FIVE TABLE FROM LAST SEGMENT.                   MPT07510
00752*        259             READ (14) IDAYS,SUM,NHR,DAY1A,HR1,HMAXA                           MPT07520
00753*        260             REWIND 14                                                          MPT07530
00754*        261             IF (IDAY.EQ.IDAYS) GO TO 610                                       MPT07540
00755*        262             WRITE (IO,1360) IDAY,IDAYS                                         MPT07550
00756*        263             STOP                                                               MPT07560
00757*        264       610   NP=IDAY*(24/NAVG)                                                  MPT07570
00758*                C       IF OPTION 21 = 1, WRITE INITIAL INFO TO UNIT 10                    MPT07580
00759*        265             IF (IOPT(21).EQ.1) WRITE (10) NPER,NAVG,LINE1,LINE2,LINE3          MPT07590
00760*        266             IF (IOPT(22).EQ.0) GO TO 640                                       MPT07600
00761*        267             IF (IDAY.LE.0) GO TO 630                                           MPT07610
00762*                C       SKIP REVIOUSLY GENERATED HOURLY RECORDS.                           MPT07620
00763*        268             ISKIP=IDAY*24+2                                                    MPT07630
00764*        269             DO 620 I=1,ISKIP                                                   MPT07640
00765*        270       620   READ (12)                                                          MPT07650
00766*        271             GO TO 640                                                          MPT07660
00767*                C       WRITE LEAD TWO RECORDS ON HOURLY FILE.                             MPT07670
00768*        272       630   WRITE (12) NPER,NAVG,LINE1,LINE2,LINE3                             MPT07680
00769*        273             WRITE (12) NRECEP,(RREC(I),I=1,NRECEP),(SREC(J),J=1,NRECEP)        MPT07690
00770*        274       640   IF (IOPT(23).EQ.0) GO TO 670                                       MPT07700
00771*        275             IF (IDAY.LE.0) GO TO 660                                           MPT07710
00772*                C       SKIP PREVIOUSLY GENERATED AVERAGING-PERIOD FILE.                   MPT07720
00773*        276             ISKIP=NP+2                                                         MPT07730
00774*        277             DO 650 I=1,ISKIP                                                   MPT07740
00775*        278       650   READ (13)                                                          MPT07750
00776*        279             GO TO 670                                                          MPT07760
00777*                C       WRITE LEAD TWO RECORDS ON AVERAGING PERIOD FILE.                   MPT07770
00778*        280       660   WRITE (13) NPER,NAVG,LINE1,LINE2,LINE3                             MPT07780
00779*        281             WRITE (13) NRECEP,(RREC(I),I=1,NRECEP),(SREC(J),J=1,NRECEP)        MPT07790
00780*        282       670   IF (IOPT(6).EQ.0) GO TO 690                                        MPT07800
00781*        283             IF (IDAY.LE.0) GO TO 690                                           MPT07810
00782*        284             ISKIP=IDAY*24                                                      MPT07820
00783*        285             DO 680 I=1,ISKIP                                                   MPT07830
00784*        286       680   READ (15)                                                          MPT07840
00785*        287       690   IDAY=IDATE(2)-1                                                    MPT07850
00786*        288             IF (IDAY.LE.0.OR.IOPT(5).EQ.1) GO TO 710                           MPT07860
00787*                C       SKIP PREVIOUSLY USED HOURLY EMISSION RECORDS.                      MPT07870
00788*        289             DO 700 I=1,IDAY                                                    MPT07880
00789*        290       700   READ (11)                                                          MPT07890
00790*        291       710   CONTINUE                                                           MPT07900
00791*                C                                                                          MPT07910
00792*                C->->->->SECTION 0 - START LOOPS FOR DAY AND AVG TIME; READ MET DATA.     MPT07920
00793*                C                                                                          MPT07930
00794*        292       720   IDAY=IDAY+1                                                        MPT07940
00795*        293             DAY=IDAY                                                           MPT07950
00796*        294             NHRS=0                                                             MPT07960
00797*        295             IF (IOPT(5).EQ.1) GO TO 760                                        MPT07970
00798*                C       IF OPTION 5 EQUALS ZERO, INPUT MET DATA OFF DISK (UNIT 11)         MPT07980
00799*        296             READ (11) JYR,IMO,DAY1,IKST,QU,QTEMP,DUMR,QTHETA,HLH               MPT07990
00800*        297             IF (JYR.NE.IDATE(1)) GO TO 730                                     MPT08000
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00801*      298          IF (DAY1.EQ.DAY) GO TO 740
00802*              C        DATE ON MET TAPE DOES NOT MATCH INTERNAL DATE                 MPT08010
00803*      299     730  WRITE (IO,1770) JYR,IDATE(2),IDATE(1),IDAY                        MPT08020
00804*      300          STOP                                                              MPT08030
00805*              C        MODIFY WIND VECTOR BY 180 DEGREES. SINCE FLOW VECTORS WERE    MPT08040
00806*              C        OUTPUT FROM RAMMET. THIS CONVERTS BACK TO WIND DIRECTIONS.    MPT08050
00807*      301     740  IDATE(2)=DAY1                                                     MPT08060
00808*      302          DO 750 IQ=1,24                                                    MPT08070
00809*      303          IF (IKST(IQ).EQ.7) IKST(IQ)=6                                     MPT08080
00810*      304          QTHETA(IQ)=QTHETA(IQ)+180.                                        MPT08090
00811*      305          IF (QTHETA(IQ).GT.360.) QTHETA(IQ)=QTHETA(IQ)-360.                MPT08100
00812*              C        RURAL MIXING HEIGHTS ARE USED FOR THIS APPLICATION            MPT08110
00813*      306     750  QHL(IQ)=HLH(1,IQ)                                                 MPT08120
00814*      307     760  NB=IHSTRT                                                         MPT08130
00815*      308          NE=NB+NAVG-1                                                      MPT08140
00816*      309          IF (NB.GT.0) GO TO 770                                            MPT08150
00817*      310          WRITE (IO,1780) IHSTRT                                            MPT08160
00818*      311          STOP                                                              MPT08170
00819*              C        START LOOP FOR AVERAGING PERIOD.                              MPT08180
00820*      312     770  U=0.0                                                             MPT08190
00821*      313          TEMP=0.0                                                          MPT08200
00822*      314          DELN=0.0                                                          MPT08210
00823*      315          DELM=0.0                                                          MPT08220
00824*      316          DO 780 I=1,7                                                      MPT08230
00825*      317     780  IFREQ(I)=0.0                                                      MPT08240
00826*      318          DO 800 I=NB,NE                                                    MPT08250
00827*      319          JHR=I                                                             MPT08260
00828*      320          DAY2=IDATE(2)                                                     MPT08270
00829*      321          IF (IOPT(5).EQ.0) GO TO 790                                       MPT08280
00830*              C                                                                      MPT08290
00831*              C        READ CARD TYPE 14 IF IOPT(5) =1. (HOURLY MET DATA)            MPT08300
00832*              C         (SEE DESCRIPTION, SECTION B).                                MPT08310
00833*              C                                                                      MPT08320
00834*      322          READ (IN, *  ) JYR,DAY1,JHR,IKST(JHR),QU(JHR),QTEMP(JHR),QTHETA(JHMPT08330
00835*              1R),QHL(JHR)                                                           MPT08340
00836*      323          IF (I.NE.NB) GO TO 790                                            MPT08350
00837*              C        REDEFINE START HOURS AND DATES AT FIRST HOUR OF EACH          MPT08360
00838*              C         AVERAGING PERIOD IF READING HOURLY MET DATA.                 MPT08370
00839*      324          IDATE(1)=JYR                                                      MPT08380
00840*      325          IHSTRT=JHR                                                        MPT08390
00841*      326          ISTDAY=DAY1                                                       MPT08400
00842*      327          IDATE(2)=ISTDAY                                                   MPT08410
00843*      328          DAY2=IDATE(2)                                                     MPT08420
00844*      329     790  IF (IKST(JHR).EQ.7) IKST(JHR)=6                                   MPT08430
00845*      330          IF (IOPT(10).EQ.1) GO TO 800                                      MPT08440
00846*              C                                                                      MPT08450
00847*              C->->->->SECTION P - CALCULATE AND STORE FOR HIGH-FIVE TABLE.          MPT08460
00848*              C                                                                      MPT08470
00849*      331          IF (I.EQ.NB) WRITE (IO,1690) IDATE                                MPT08480
00850*      332          TRAD=QTHETA(JHR)*0.01745329                                       MPT08490
                                                                                           MPT08500
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00851*     333         WRITE (IO,1700) JHR,QTHETA(JHR),QU(JHR),QH(JHR),QTEMP(JHR),IKST(JMPT08510
00852*                1HR)                                                              MPT08520
00853*     334         SINT=SIN(TRAD)                                                    MPT08530
00854*     335         COST=COS(TRAD)                                                    MPT08540
00855*           C        CALCULATE WIND COMPONENTS                                      MPT08550
00856*     336         URES=QU(JHR)                                                      MPT08560
00857*     337         UR=URES*SINT                                                      MPT08570
00858*     338         VR=URES*COST                                                      MPT08580
00859*     339         DELM=DELM+UR                                                      MPT08590
00860*     340         DELN=DELN+VR                                                      MPT08600
00861*     341         TEMP=TEMP+QTEMP(JHR)                                              MPT08610
00862*     342         U=U+URES                                                          MPT08620
00863*     343         KST=IKST(JHR)                                                     MPT08630
00864*     344         IFREQ(KST)=IFREQ(KST)+1                                           MPT08640
00865*           C        END LOOP TO READ ALL MET DATA FOR AVERAGING PERIOD.            MPT08650
00866*     345   800   CONTINUE                                                          MPT08660
00867*     346         IF (IOPT(10).EQ.1) GO TO 860                                      MPT08670
00868*           C        CALCULATE RESULTANT  WIND DIRECTION THETA                      MPT08680
00869*     347         DELN=DELN/NAVG                                                    MPT08690
00870*     348         DELM=DELM/NAVG                                                    MPT08700
00871*     349         THETA=ANGARC(DELM,DELN)                                           MPT08710
00872*           C        CALCULATE AVERAGE AND RESULTANT SPEED AND PERSISTENCE.         MPT08720
00873*     350         U=U/NAVG                                                          MPT08730
00874*     351         TEMP=TEMP/NAVG                                                    MPT08740
00875*     352         URES=SQRT(DELN*DELN+DELM*DELM)                                    MPT08750
00876*     353         PERSIS=URES/U                                                     MPT08760
00877*           C        DETERMINE MODAL AND AVERAGE STABILITY                          MPT08770
00878*     354         LSMAX=0                                                           MPT08780
00879*     355         DO 810 I=1,7                                                      MPT08790
00880*     356         LST=IFREQ(I)                                                      MPT08800
00881*     357         IF (LST.LE.LSMAX) GO TO 810                                       MPT08810
00882*     358         LSMAX=LST                                                         MPT08820
00883*     359         LSTAB=I                                                           MPT08830
00884*     360   810   CONTINUE                                                          MPT08840
00885*     361         IP1=LSTAB+1                                                       MPT08850
00886*     362         KST=LSTAB                                                         MPT08860
00887*     363         DO 820 I=IP1,7                                                    MPT08870
00888*     364         IF (LSMAX.EQ.IFREQ(I)) GO TO 830                                  MPT08880
00889*     365   820   CONTINUE                                                          MPT08890
00890*     366         GO TO 850                                                         MPT08900
00891*           C        IF TIE FOR MAX MODAL STABILITY CALCULATE AVERAGE STABILITY     MPT08910
00892*     367   830   KSUM=0                                                            MPT08920
00893*     368         DO 840 J=1,7                                                      MPT08930
00894*     369   840   KSUM=KSUM+IFREQ(J)*J                                              MPT08940
00895*     370         KST=FLOAT(KSUM)/FLOAT(NAVG)+0.5                                   MPT08950
00896*           C        PRINT RESULTANT MET DATA SUMMARY FOR AVERAGING PERIOD.         MPT08960
00897*     371   850   WRITE (IO,1710)                                                   MPT08970
00898*     372         WRITE (IO,1720) THETA,URES,U,TEMP,PERSIS,KST                      MPT08980
00899*           C        REDEFINE NB AND NF IN CASE NON-CONSECUTIVE DAYS ARE BEING RUN  MPT08990
00900*     373   860   IF (IOPT(5).EQ.0) GO TO 870                                       MPT09000
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00901*      374          NB=IHSTRT                                                          MPT09010
00902*      375          NE=IHSTRT+NAVG-1                                                   MPT09020
00903*            C                                                                         MPT09030
00904*            C->->->->SECTION Q - INITIALIZE FOR HOURLY LOOP.                          MPT09040
00905*            C                                                                         MPT09050
00906*            C          INITIALIZE SUMS FOR CONC AND PARTIAL CONC FOR AVG PERIOD.      MPT09060
00907*      376   870    DO 890 K=1,NRECEP                                                  MPT09070
00908*      377          PCHI(K)=0.0                                                        MPT09080
00909*      378          DO 880 I=1,26                                                      MPT09090
00910*      379   880    PSIGS(K,I)=0.0                                                     MPT09100
00911*      380   890    CONTINUE                                                           MPT09110
00912*            C          IF SAVING PARTIAL CONCENTRATIONS, WRITE INITIAL RECEPTOR INFO. MPT09120
00913*      381          IF (IOPT(21).EQ.0) GO TO 900                                       MPT09130
00914*      382          WRITE (10) NRECEP,NPT,(RREC(I),I=1,NRECEP),(SREC(I),I=1,NRECEP)    MPT09140
00915*            C                                                                         MPT09150
00916*            C->->->->SECTION R - BEGIN HOURLY LOOP.                                   MPT09160
00917*            C                                                                         MPT09170
00918*      383   900    DO 1020 ILH=NB,NE                                                  MPT09180
00919*      384          LH=ILH                                                             MPT09190
00920*      385          IF (LH.LE.24) GO TO 910                                            MPT09200
00921*      386          LH=MOD(ILH,24)                                                     MPT09210
00922*      387          IF (LH.EQ.1) IDATE(2)=DAY1                                         MPT09220
00923*            C          INITIALIZE SUMS FOR CONC AND PARTIAL CONC FOR HOURLY PERIODS.  MPT09230
00924*      388   910    DO 930 K=1,NRECEP                                                  MPT09240
00925*      389          PHCHI(K)=0.0                                                       MPT09250
00926*      390          DO 920 I=1,26                                                      MPT09260
00927*      391   920    PHSIGS(K,I)=0.0                                                    MPT09270
00928*      392   930    CONTINUE                                                           MPT09280
00929*            C          SET MET CONDITIONS FOR THIS HOUR                               MPT09290
00930*      393          THETA=QTHETA(LH)                                                   MPT09300
00931*      394          U=QU(LH)                                                           MPT09310
00932*      395          HL=QHL(LH)                                                         MPT09320
00933*      396          TEMP=QTEMP(LH)                                                     MPT09330
00934*      397          KST=IKST(LH)                                                       MPT09340
00935*      398          TRAD=THETA*0.01745329                                              MPT09350
00936*      399          SINT=SIN(TRAD)                                                     MPT09360
00937*      400          COST=COS(TRAD)                                                     MPT09370
00938*      401          CTER=CONTER(KST)                                                   MPT09380
00939*            C          IF OPTION A IS 1, READ HOURLY EMISSIONS.                       MPT09390
00940*      402          IF (IOPT(A).EQ.0) GO TO 940                                        MPT09400
00941*      403          IDCK=IDATE(1)*1000000+IDATE(2)*100+LH                              MPT09410
00942*      404          READ (15) IDATP,(SOURCE(IPOL,I),I=1,NPT)                           MPT09420
00943*            C          CHECK DATE                                                     MPT09430
00944*      405          IF (IDCK.EQ.IDATP) GO TO 940                                       MPT09440
00945*      406          WRITE (IO,1390) IDCK,IDATP                                         MPT09450
00946*      407          STOP                                                               MPT09460
00947*            C          CALCULATE POINT SOURCE CONTRIBUTIONS                           MPT09470
00948*      408   940    CALL PTR                                                           MPT09480
00949*      409          IF (IOPT(22).EQ.0) GO TO 950                                       MPT09490
00950*            C          WRITE HOURLY CONCENTRATIONS TO TAPE                            MPT09500
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00951*     410          WRITE (12) IDATE(2),LH,(PHCHI(I),I=1,NRECEP)                      MPT09510
00952*              C                                                                     MPT09520
00953*              C->->->->SECTION S - CALCULATE AND STORE FOR HIGH-FIVE TABLE.         MPT09530
00954*              C                                                                     MPT09540
00955*     411      950 NHR=NHR+1                                                         MPT09550
00956*              C         IF OPTION 19 IS 1, DELETE COMPUTATIONS FOR AVG CONC.        MPT09560
00957*              C          FOR LENGTH OF RECORD AND HIGH-FIVE TABLE.                  MPT09570
00958*     412          IF (IOPT(19).EQ.1) GO TO 1010                                     MPT09580
00959*              C         CUMULATE CONCENTRATIONS FOR AVG TIMES AND LENGTH OF RECORD. MPT09590
00960*     413          DO 970 K=1,NRECEP                                                 MPT09600
00961*     414          DO 960 L=1,NAVT                                                   MPT09610
00962*     415      960 CONC(K,L)=CONC(K,L)+PHCHI(K)                                      MPT09620
00963*     416      970 SUM(K)=SUM(K)+PHCHI(K)                                            MPT09630
00964*              C            STORE DATE FOR WHICH CONCS. HAVE BEEN CALCULATED.        MPT09640
00965*     417          JDAY=IDATE(2)                                                     MPT09650
00966*              C         SUBROUTINE RANK IS CALLED WHENEVER A COUNTER                MPT09660
00967*              C         INDICATES THAT ENOUGH END TO END HOURLY CONCENTRATIONS      MPT09670
00968*              C         HAVE BEEN STORED OFF TO COMPLETE AN AVG TIME.               MPT09680
00969*              C         NP3, NP8, NP24, NPX ARE USED AS COUNTERS FOR EACH           MPT09690
00970*              C         AVG TIME AND ARE ZEROED AFTER EACH CALL TO RANK.            MPT09700
00971*     418          CALL RANK (1)                                                     MPT09710
00972*     419          NP3=NP3+1                                                         MPT09720
00973*     420          IF (NP3.NE.3) GO TO 980                                           MPT09730
00974*     421          CALL RANK (2)                                                     MPT09740
00975*     422          NP3=0                                                             MPT09750
00976*     423      980 NP8=NP8+1                                                         MPT09760
00977*     424          IF (NP8.NE.8) GO TO 990                                           MPT09770
00978*     425          CALL RANK (3)                                                     MPT09780
00979*     426          NP8=0                                                             MPT09790
00980*     427      990 NP24=NP24+1                                                       MPT09800
00981*     428          IF (NP24.NE.24) GO TO 1000                                        MPT09810
00982*     429          CALL RANK (4)                                                     MPT09820
00983*     430          NP24=0                                                            MPT09830
00984*     431     1000 IF (NAVT.EQ.4) GO TO 1010                                         MPT09840
00985*     432          NPX=NPX+1                                                         MPT09850
00986*     433          IF (NPX.NE.NAVS) GO TO 1010                                       MPT09860
00987*     434          CALL RANK (5)                                                     MPT09870
00988*     435          NPX=0                                                             MPT09880
00989*              C                                                                     MPT09890
00990*              C->->->->SECTION T - END HOURLY, AVERAGING TIME, AND DAILY LOOPS.     MPT09900
00991*              C                                                                     MPT09910
00992*     436     1010 IF (IOPT(11).EQ.1.AND.IOPT(14).EQ.1) GO TO 1020                   MPT09920
00993*              C         IF BOTH OPTIONS 11 AND 14 CALL FOR OUTPUT DELETIONS,        MPT09930
00994*              C          SKIP HOURLY PRINTOUT.                                      MPT09940
00995*     437          CALL OUTHR                                                        MPT09950
00996*     438     1020 CONTINUE                                                          MPT09960
00997*              C                                                                     MPT09970
00998*              C          END OF HOURLY LOOP                                         MPT09980
00999*              C                                                                     MPT09990
01000*     439          IF (NE.GT.24) IDATE(2)=ISTDAY                                     MPT10000
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01001*                 C          OUTPUT FINAL RESULTS
01002*          440               CALL OUTAVG                                                                MPT10010
01003*          441               NP=NP+1                                                                    MPT10020
01004*          442               NHRS=NHRS+NAVG                                                             MPT10030
01005*                 C          NEXT STATEMENT IS BRANCH FOR END OF RUN.                                   MPT10040
01006*          443               IF (NP.GE.NPER) GO TO 1050                                                 MPT10050
01007*          444               IF (NHRS.LT.24) GO TO 1030                                                 MPT10060
01008*          445               IF (IOPT(20).EQ.0) GO TO 720                                               MPT10070
01009*                 C          NEXT STATEMENT CHECKS FOR END OF SEGMENTED RUN.                            MPT10080
01010*          446               IF (IDAY.GE.LDRUN) GO TO 1040                                              MPT10090
01011*          447               GO TO 720                                                                  MPT10100
01012*                 C                                                                                     MPT10110
01013*                 C            END OF LOOP FOR CALENDAR DAYS                                            MPT10120
01014*                 C                                                                                     MPT10130
01015*          448    1030 NB=NB+NAVG                                                                       MPT10140
01016*          449               NE=NE+NAVG                                                                 MPT10150
01017*          450               IF (NB.LE.24) GO TO 770                                                    MPT10160
01018*          451               NB=MOD(NB,24)                                                              MPT10170
01019*          452               NE=NB+NAVG-1                                                               MPT10180
01020*          453               GO TO 770                                                                  MPT10190
01021*                 C                                                                                     MPT10200
01022*                 C          END OF LOOP FOR AVERAGING PERIOD.                                          MPT10210
01023*                 C                                                                                     MPT10220
01024*                 C          IF SEGMENTED RUN, TEMPORARILY STORE                                        MPT10230
01025*                 C           HIGH-FIVE INFO ON UNIT 14 FILE.                                           MPT10240
01026*          454    1040 WRITE (14) IDAY,SUM,NHR,DAY1A,HR1,HMAXA                                          MPT10250
01027*          455               WRITE (IO,1730) IDAY                                                       MPT10260
01028*          456               GO TO 1140                                                                 MPT10270
01029*          457    1050 IF (IOPT(19).EQ.1) GO TO 1140                                                    MPT10280
01030*                 C                                                                                     MPT10290
01031*                 C->->->->SECTION U - WRITE AVERAGE CONC. AND HIGH-FIVE TABLES.                        MPT10300
01032*                 C                                                                                     MPT10310
01033*                 C          IF OPTION 19 = 0, WRITE AVERAGE CONCENTRATION.                             MPT10320
01034*                 C           FOR LENGTH OF RECORD AND HIGH-FIVE TABLE.                                 MPT10330
01035*          458               DO 1060 J=1,NRECEP                                                         MPT10340
01036*          459               STAR(1,J)=BLNK                                                             MPT10350
01037*          460               STAR(2,J)=BLNK                                                             MPT10360
01038*          461    1060 CONTINUE                                                                         MPT10370
01039*          462               WRITE (IO,1800) LINE1,LINE2,LINE3                                          MPT10380
01040*          463               HR2=NB                                                                     MPT10390
01041*          464               SUM(1)=SUM(1)/NHR                                                          MPT10400
01042*          465               HIMAX=SUM(1)                                                               MPT10410
01043*          466               KMX=1                                                                      MPT10420
01044*                 C          INITIALIZE PERIODIC CONC TO BEGIN RANKING FOR PERIODIC MAX                 MPT10430
01045*          467               DO 1070 K=2,NRECEP                                                         MPT10440
01046*          468               SUM(K)=SUM(K)/NHR                                                          MPT10450
01047*          469               IF (SUM(K).LE.HIMAX) GO TO 1070                                            MPT10460
01048*          470               KMX=K                                                                      MPT10470
01049*          471               HIMAX=SUM(K)                                                               MPT10480
01050*          472    1070 CONTINUE                                                                         MPT10490
                                                                                                             MPT10500
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01051*        473              STAR(1,KMX)=STR                                                 MPT10510
01052*                    C        FIND HIGHEST AVERAGE CONC. AMONG RECEPTORS.                 MPT10520
01053*        474              WRITE (IO,1740) DAY1A,HR1,DAY2,HR2                              MPT10530
01054*        475              DO 1080 K=1,NRECEP                                              MPT10540
01055*        476         1080 WRITE (IO,1750) K,(RNAME(J,K),J=1,2),RREC(K),SREC(K),ZR(K),ELR(K),MPT10550
01056*                        1STAR(1,K),SUM(K)                                                MPT10560
01057*        477              STAR(1,KMX)=BLNK                                                MPT10570
01058*                    C        LOOP TO WRITE HIGH-FIVE TABLE FOR 4 OR 5 AVG TIMES.         MPT10580
01059*        478              DO 1130 L=1,NAVT                                                MPT10590
01060*                    C        ASTERISKS DEPICT RECEPTORS WITH HIGHEST AND                 MPT10600
01061*                    C         SECOND HIGHEST CONCENTRATIONS.                             MPT10610
01062*        479              K1=1                                                            MPT10620
01063*        480              K2=1                                                            MPT10630
01064*        481              HI1=HMAXA(1,1,L)                                                MPT10640
01065*        482              HI2=HMAXA(2,1,L)                                                MPT10650
01066*        483              DO 1100 K=2,NRECEP                                              MPT10660
01067*        484              IF (HMAXA(1,K,L).LE.HI1) GO TO 1090                             MPT10670
01068*        485              HI1=HMAXA(1,K,L)                                                MPT10680
01069*        486              K1=K                                                            MPT10690
01070*        487         1090 IF (HMAXA(2,K,L).LE.HI2) GO TO 1100                             MPT10700
01071*        488              HI2=HMAXA(2,K,L)                                                MPT10710
01072*        489              K2=K                                                            MPT10720
01073*        490         1100 CONTINUE                                                        MPT10730
01074*        491              STAR(1,K1)=STR                                                  MPT10740
01075*        492              STAR(2,K2)=STR                                                  MPT10750
01076*        493              WRITE (IO,1760) NTIME(L),TITLE(IP),(I,I=1,6)                    MPT10760
01077*        494              DUM=ATIME(L)                                                    MPT10770
01078*        495              DO 1120 K=1,NRECEP                                              MPT10780
01079*        496              DO 1110 J=1,5                                                   MPT10790
01080*        497         1110 HMAXA(J,K,L)=HMAXA(J,K,L)/DUM                                   MPT10800
01081*        498              WRITE (IO,1770) K,RREC(K),SREC(K),(STAR(J,K),HMAXA(J,K,L),NDAY(J,KMPT10810
01082*                        1,L),IHR(J,K,L),J=1,2),(HMAXA(J,K,L),NDAY(J,K,L),IHR(J,K,L),J=3,5) MPT10820
01083*        499         1120 CONTINUE                                                        MPT10830
01084*                    C        INITIALIZE ASTERISK STORAGE TO BLANKS.                      MPT10840
01085*        500              STAR(1,K1)=BLNK                                                 MPT10850
01086*        501              STAR(2,K2)=BLNK                                                 MPT10860
01087*        502         1130 CONTINUE                                                        MPT10870
01088*                    C                                                                    MPT10880
01089*                    C->->->->SECTION V - CLOSE OUT FILES.                                MPT10890
01090*                    C                                                                    MPT10900
01091*        503         1140 IF (IOPT(21).EQ.0) GO TO 1150                                   MPT10910
01092*        504              END FILE 10                                                     MPT10920
01093*        505              END FILE 10                                                     MPT10930
01094*        506         1150 IF (IOPT(22).EQ.0) GO TO 1160                                   MPT10940
01095*        507              END FILE 12                                                     MPT10950
01096*        508              END FILE 12                                                     MPT10960
01097*        509         1160 IF (IOPT(23).EQ.0) GO TO 1170                                   MPT10970
01098*        510              END FILE 13                                                     MPT10980
01099*        511              END FILE 13                                                     MPT10990
01100*        512         1170 STOP                                                            MPT11000
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C                                                                               MPT11010
C->->->->SECTION X - OUTLINE OF PROGRAM SECTIONS                                MPT11020
C                                                                               MPT11030
C          SECTION A - GENERAL REMARKS                                          MPT11040
C          SECTION B - DATA INPUT LISTS.                                        MPT11050
C          SECTION C - COMMON, DIMENSION, AND DATA STATEMENTS.                  MPT11060
C          SECTION D - FLOW DIAGRAM.                                            MPT11070
C          SECTION E - RUN SET-UP AND READ FIRST 4 INPUT CARDS.                 MPT11080
C          SECTION F - INPUT AND PROCESS EMISSION INFORMATION.                  MPT11090
C          SECTION G - RANK SIGNIFICANT SOURCES.                                MPT11100
C          SECTION H - EMISSIONS WITH HEIGHT TABLE.                             MPT11110
C          SECTION I - EXECUTE FOR INPUT OF SIGNIFICANT SOURCE NUMBERS.         MPT11120
C          SECTION J - CHECK MET. DATA IF FROM FILE OF ONE YEARS'S DATA.        MPT11130
C          SECTION K - GENERATE POLAR COORDINATE RECEPTORS.                     MPT11140
C          SECTION L - READ POLAR COORDINATE ELEVATIONS.                        MPT11150
C          SECTION M - READ AND PROCESS RECEPTOR INFORMATION.                   MPT11160
C          SECTION N - POSITION FILES AS REQUIRED.                              MPT11170
C          SECTION O - START LOOPS FOR DAY AND AVERAGING TIME; READ             MPT11180
C                          MET. DATA.                                           MPT11190
C          SECTION P - CALCULATE AND WRITE MET. SUMMARY INFORMATION.            MPT11200
C          SECTION Q - INITIALIZE FOR HOURLY LOOP.                              MPT11210
C          SECTION R - BEGIN HOURLY LOOP.                                       MPT11220
C          SECTION S - CALCULATE AND STORE FOR HIGH-FIVE TABLE.                 MPT11230
C          SECTION T - END HOURLY, AVERAGING TIME, AND DAILY LOOPS.             MPT11240
C          SECTION U - WRITE AVERAGE CONC. AND HIGH-FIVE TABLES.                MPT11250
C          SECTION V - CLOSE OUT FILES.                                         MPT11260
C          SECTION W - FORMAT STATEMENTS.                                       MPT11270
C          SECTION X - OUTLINE OF PROGRAM SECTIONS.                             MPT11280
C          SECTION Y - INPUT AND OUTPUT FILE DESCRIPTIONS.                      MPT11290
C          SECTION Z - INDEX AND GLOSSARY.                                      MPT11300
C                                                                               MPT11310
C                                                                               MPT11320
C->->->-> SECTION Y -  INPUT AND OUTPUT FILE DESCRIPTIONS.                       MPT11330
C                                                                               MPT11340
C***       INPUT AND OUTPUT FILE DESCRIPTIONS.                                  MPT11350
C                                                                               MPT11360
C*** INPUT FILE (UNIT 11) METEOROLOGICAL DATA (USED IF IOPT(5)=0)               MPT11370
C                                                                               MPT11380
C        RECORD 1                                                               MPT11390
C                                                                               MPT11400
C          ID           SFC STATION IDENTIFIER, 5 DIGITS                        MPT11410
C          IYEAR        YEAR OF SURFACE DATA, 2 DIGITS                          MPT11420
C          IDM          MIX HT STATION IDENTIFIER, 5 DIGITS                     MPT11430
C          IYR          YEAR OF MIX HT DATA, 2 DIGITS                           MPT11440
C                                                                               MPT11450
C        RECORD TYPE 2 (ONE FOR EACH DAY OF YEAR)                               MPT11460
C                                                                               MPT11470
C          JYR          YEAR                                                    MPT11480
C          IMO          MONTH                                                   MPT11490
C          DAY1         JULIAN DAY                                              MPT11500
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C        IKST(24)    STABILITY CLASS                                           MPT11510
C        QU(24)      WIND SPEED, METERS PER SECOND                             MPT11520
C        QTEMP(24)   AMBIENT AIR TEMPERATURE, KELVIN                           MPT11530
C        QUMR(24)    FLOW VECTOR TO 10 DEG, DEGREES AZIMUTH                    MPT11540
C        QTHETA(24)  RANDOMIZED FLOW VECTOR, DEGREES AZIMUTH                   MPT11550
C        HLH(2,24)   MIXING HEIGHT, METERS                                     MPT11560
C                                                                              MPT11570
C** INPUT FILE(UNIT 15) EMISSION DATA (USED IF IOPT(6)=1)                      MPT11580
C                                                                              MPT11590
C     RECORD TYPE 1 (ONE FOR EACH HOUR OF SIMULATION)                          MPT11600
C                                                                              MPT11610
C        IDATP       DATE-TIME INDICATOR CONSISTING OF YEAR, JULIAN DAY,       MPT11620
C                     AND HOUR: YYDDDHH.                                       MPT11630
C        SOURCE(IPOL,I),I=1,NPT  EMISSION RATE FOR THE POLLUTANT IPOL          MPT11640
C                                FOR EACH SOURCE, GRAMS PER SECOND.            MPT11650
C                                                                              MPT11660
C** OUTPUT PUNCHED CARDS (UNIT 1) AVERAGE CONCENTRATIONS (PUNCHED IF           MPT11670
C                                IOPT(24)=1)                                   MPT11680
C                                                                              MPT11690
C     CARD TYPE 1 (ONE FOR EACH RECEPTOR FOR EACH AVERAGING TIME)              MPT11700
C                                                                              MPT11710
C        CC:1-4      WORD "CNTL" PUNCHED                                       MPT11720
C        CC:5        BLANK                                                     MPT11730
C        CC:6-15     RREC  EAST COORDINATE OF RECEPTOR, USER UNITS             MPT11740
C        CC:16-25    SREC  NORTH COORDINATE OF RECEPTOR, USER UNITS            MPT11750
C        CC:26-35    GWU   CONCENTRATION FOR AVERAGING TIME, MICROG/M**3MPT11760
C        CC:36-55    BLANK                                                     MPT11770
C        CC:56-59    K     RECEPTOR NUMBER                                     MPT11780
C        CC:60-69    ZR    RECEPTOR HEIGHT ABOVE GROUND, METERS                MPT11790
C        CC:70-79    ELR  RECEPTOR GROUND-LEVEL ELEVATION, USER HT UNITSMPT11800
C                                                                              MPT11810
C** OUTPUT FILE (UNIT 10) PARTIAL CONCENTRATIONS (USED IF IOPT(21)=1) MPT11820
C                                                                              MPT11830
C     RECORD TYPE 1                                                            MPT11840
C                                                                              MPT11850
C        NPER        NUMBER OF PERIODS                                         MPT11860
C        NAVG        NUMBER OF HOURS IN AVERAGING PERIOD.                      MPT11870
C        LINE1(14)   80 ALPHANUMERIC CHARACTERS FOR TITLE.                     MPT11880
C        LINE2(14)   80 ALPHANUMERIC CHARACTERS FOR TITLE.                     MPT11890
C        LINE3(14)   80 ALPHANUMERIC CHARACTERS FOR TITLE.                     MPT11900
C                                                                              MPT11910
C     RECORD TYPE 2 (FROM MPTER) (ONE FOR EACH AVERAGING PERIOD)               MPT11920
C                                                                              MPT11930
C        NRECEP      NUMBER OF RECEPTORS                                       MPT11940
C        NPT         NUMBER OF SOURCES                                         MPT11950
C        RREC(I),I=1,NRECEP  EAST COORDINATE OF RECEPTOR, USER UNITS           MPT11960
C        SREC(I),I=1,NRECEP  NORTH COORDINATE OF RECEPTOR, USER UNITS          MPT11970
C                                                                              MPT11980
C      RECORD TYPE 3 (ONE FOR EACH RECEPTOR FOR EACH SIMULATED HOUR,           MPT11990
C                    FROM PTR)                                                 MPT12000
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C                                                                        MPT12010
C      IDATE         YEAR AND JULIAN DAY                                 MPT12020
C      LH            HOUR                                                MPT12030
C      K             RECEPTOR NUMBER                                     MPT12040
C      PARTC(J),J=1,NPT   CONCENTRATION AT RECEPTOR K FROM SOURCE J,     MPT12050
C                           G/M**3.                                      MPT12060
C                                                                        MPT12070
C** * OUTPUT FILE (UNIT 12) HOURLY CONCENTRATIONS (USED IF IOPT(22)=1)    MPT12080
C                                                                        MPT12090
C    RECORD 1                                                            MPT12100
C                                                                        MPT12110
C      NPER          NUMBER OF PERIODS                                   MPT12120
C      NAVG          NUMBER OF HOURS IN AVERAGING PERIOD.                MPT12130
C      LINE1(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12140
C      LINE2(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12150
C      LINE3(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12160
C                                                                        MPT12170
C     RECORD 2                                                           MPT12180
C                                                                        MPT12190
C      NRECEP        NUMBER OF RECEPTORS.                                MPT12200
C      RREC(I), I=1,NRECEP  EAST COORDINATE OF RECEPTOR, USER UNITS       MPT12210
C      SREC(I), I=1,NRECEP  NORTH COORDINATE OF RECEPTOR, USER UNITS      MPT12220
C                                                                        MPT12230
C     RECORD TYPE 3 (ONE FOR EACH SIMULATED HOUR)                        MPT12240
C                                                                        MPT12250
C      IDATE(2)      JULIAN DAY                                          MPT12260
C      LH            HOUR                                                MPT12270
C      PHCHI(I),I=1,NRECEP  HOURLY CONCENTRATION FOR EACH RECEPTOR,       MPT12280
C                           G/M**3.                                      MPT12290
C                                                                        MPT12300
C** * OUTPUT FILE (UNIT 13) AVERAGING-PERIOD CONCENTRATIONS (USED IF      MPT12310
C                           IOPT(23)=1)                                  MPT12320
C                                                                        MPT12330
C     RECORD 1                                                           MPT12340
C                                                                        MPT12350
C      NPER          NUMBER OF PERIODS                                   MPT12360
C      NAVG          NUMBER OF HOURS IN AVERAGING PERIOD.                MPT12370
C      LINE1(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12380
C      LINE2(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12390
C      LINE3(14)     80 ALPHANUMERIC CHARACTERS FOR TITLE.               MPT12400
C                                                                        MPT12410
C     RECORD 2                                                           MPT12420
C                                                                        MPT12430
C      NRECEP        NUMBER OF RECEPTORS.                                MPT12440
C      RREC(I), I=1,NRECEP  EAST COORDINATE OF RECEPTOR, USER UNITS       MPT12450
C      SREC(I), I=1,NRECEP  NORTH COORDINATE OF RECEPTOR, USER UNITS      MPT12460
C                                                                        MPT12470
C     RECORD TYPE 3 (ONE FOR EACH SIMULATED AVERAGING PERIOD)            MPT12480
C                                                                        MPT12490
C      IDATE(2)      JULIAN DAY                                          MPT12500
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             C        NB              ENDING HOUR OF PERIOD                         MPT12510
             C        PCHI(K),K=1,NRECEP  AVERAGING PERIOD CONCENTRATION FOR EACH   MPT12520
             C                             RECEPTOR, G/M**3.                        MPT12530
             C                                                                      MPT12540
             C                                                                      MPT12550
             C** TEMPORARY FILE (UNIT 14) VALUES FOR HIGH-FIVE TABLES (USED IF      MPT12560
             C                                  IOPT(20)=1)                         MPT12570
             C                                                                      MPT12580
             C       ONLY RECORD                                                    MPT12590
             C                                                                      MPT12600
             C        NDAY(ON WRITE)    NUMBER OF DAYS PROCESSED                    MPT12610
             C        IDAYS(ON READ     NUMBER OF DAYS PREVIOUSLY PROCESSED         MPT12620
             C        SUM(180)          CUMULATION OF LONG-TERM CONCENTRATION,(G/M**3MPT12630
             C        NHR               NUMBER OF HOURS PROCESSED                   MPT12640
             C        DAY1A             JULIAN DAY OF START OF LENGTH OF RECORD.    MPT12650
             C        HR1               START HOUR OF LENGTH OF RECORD              MPT12660
             C        HMAXA(3,5,180,5)  HIGHEST FIVE CONCENTRATIONS (G/M**3), AND   MPT12670
             C                           ASSOCIATED DAY AND HOUR, FOR EACH RECEPTOR, MPT12680
             C                           FOR FIVE DIFFERENT AVERAGING TIMES.        MPT12690
             C                                                                      MPT12700
             C->->->->SECTION W - FORMAT STATEMENTS.                                MPT12710
             C                                                                      MPT12720
             C        INPUT FORMATS                                                 MPT12730
             C                                                                      MPT12740
        13   1180  FORMAT (20A4/20A4/20A4)                                          MPT12750
       514   1200  FORMAT (A4)                                                      MPT12760
       515   1210  FORMAT (3A4,8F8.2,F8.0)                                          MPT12770
       516   1220  FORMAT (26I3)                                                    MPT12780
       517   1230  FORMAT (I2,8X,5F10.0)                                            MPT12790
       518   1240  FORMAT (2A4,2F10.3,2F10.0)                                       MPT12800
             C                                                                      MPT12810
             C        ERROR STATEMENT FORMATS                                       MPT12820
             C                                                                      MPT12830
       519   1250  FORMAT (1X,' NSIGP (THE NO. OF SIGNF POINT SOURCES) WAS FOUND ',' TMPT12840
                  1O EXCEED THE LIMIT (25).  USER TRIED TO INPUT ',I3,' SOURCES'/'  MPT12850
                  2 **********EXECUTION TERMINATED**********')                      MPT12860
       520   1260  FORMAT (1H0,'CONTER VALUE IS OUTSIDE OF RANGE: ','ZERO TO ONE . EXEMPT12870
                  1CUTION TERMINATED.')                                             MPT12880
       521   1270  FORMAT (' USER TRIED TO INPUT MORE THAN ',I4,' POINT SOURCES. THISMPT12890
                  1 GOES BEYOND THE CURRENT PROGRAM DIMENSIONS.')                   MPT12900
       522   1280  FORMAT (1X,'NPT =   ',I3,'I.E., EQUAL OR LESS THAN ZERO'/' RUN TERMMPT12910
                  1INATED---CHECK INPUT DATA')                                      MPT12920
       523   1290  FORMAT (1H ,'***ERROR---USER TRIED TO SPECIFY ',I4,' SIGNIFICANT SMPT12930
                  1OURCES, BUT IS ONLY ALLOWING ',I3,' TOTAL SIGNIFICANT SOURCES IN TMPT12940
                  2HIS RUN.',/2X,'***RUN TERMINATED-CHECK INPUT DATA!***')          MPT12950
       524   1300  FORMAT (' (MPS) THE INPUT SIGNIFICANT SOURCE NUMBER ','WAS FOUND TMPT12960
                  1O EQUAL ZERO - USER CHECK INPUT DATA.')                          MPT12970
       525   1310  FORMAT (' SURFACE DATA IDENTIFIERS READ INTO MODEL (STATION=',I5,'MPT12980
                  1 ,YEAR=',I2,') DO NOT AGREE WITH THE PREPROCESSOR OUTPUT FILE ',/1XMPT12990
                  2,' (STATION=',I5,'  ,YEAR=',I2)                                  MPT13000
       526   1320  FORMAT (' MIXING HEIGHT IDENTIFIERS READ INTO MODEL (STATION=',I5,MPT13010
                    1' ,YEAR=',I2,') DO NOT AGREE WITH THE PREPROCESSOR OUTPUT FILE',/1MPT13010
                    2X,' (STATION=',I5,' , YEAR=',I2)                                  MPT13020
       527    1330  FORMAT (1H0,' WRONG RECEPTOR ELEVATION CARD READ. ','READ CARD FOR MPT13030
                    1AZIMUTH ',I3,' SHOULD HAVE BEEN ',I3,'.')                         MPT13040
       528    1340  FORMAT (1X,'****USER EITHER TRIED TO INPUT MORE THAN 180 ','RECEPTMPT13050
                    1ORS OR ENDREC WAS NOT PLACED AFTER THE LAST RECEPTOR ','CARD****'/MPT13060
                    2'********EXECUTION TERMINATED********')                           MPT13070
       529    1350  FORMAT (1X,'NO RECEPTORS HAVE BEEN CHOSEN')                        MPT13080
       530    1360  FORMAT (1H0,'***DAYS DO NOT MATCH, IDAY = ',I4,', IDAYS = ',I4)    MPT13090
       531    1370  FORMAT (' DATE ON MET. TAPE, ',I2,I3,' ,DOES NOT MATCH INTERNAL DAMPT13100
                    1TE, ',I2,I3)                                                      MPT13110
       532    1380  FORMAT (' HOUR ',I3,' IS NOT PERMITTED. HOURS MUST BE DEFINED BETWMPT13120
                    1EEN 1 AND 24')                                                    MPT13130
       533    1390  FORMAT (' DATE BEING PROCESSED IS= ',I8/1X,'DATE OF HOURLY POINT EMPT13140
                    1MISSION RECORD IS =',I8/1X,'***PLEASE CHECK EMISSION RECORDS***') MPT13150
              C                                                                        MPT13160
              C         OUTPUT FORMATS                                                 MPT13170
              C                                                                        MPT13180
       534    1400  FORMAT ('1',T40,'MPTER - VERSION 79365'/1X,20A4/1X,20A4/1X,20A4)   MPT13190
       535    1410  FORMAT (1H0,T30,'GENERAL INPUT INFORMATION'//2X,'THIS RUN OF MPTERMPT13200
                    1-VERSION 79365 IS FOR ','THE POLLUTANT ',A4,' FOR ',I3,1X,I3,'-HOUMPT13210
                    2R PERIODS.'/2X,'CONCENTRATION ESTIMATES BEGIN ON HOUR-',I2,', JULIMPT13220
                    3AN DAY-',I3,', YEAR-19',I2,'.'/1X,' A FACTOR OF ',F14.7,' HAS BEENMPT13230
                    4 SPECIFIED TO ','CONVERT USER LENGTH UNITS TO KILOMETERS.'/1X,I3,'MPT13240
                    5 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.')                      MPT13250
       536    1420  FORMAT (1H ,'THIS RUN WILL NOT CONSIDER ANY POLLUTANT LOSS.')      MPT13260
       537    1430  FORMAT (1H ,2X,'A HALF-LIFE OF ',F10.2,' (SECONDS) HAS BEEN ASSUMEMPT13270
                    1D BY THE USER.')                                                  MPT13280
       538    1440  FORMAT (1X,' HIGH-FIVE SUMMARY CONCENTRATION TABLES ','WILL BE OUTMPT13290
                    1PUT FOR ',I3,' AVERAGING PERIODS.'/'  AVG TIMES ','OF 1,3,8, AND 2MPT13300
                    24 HOURS ARE AUTOMATICALLY DISPLAYED.')                            MPT13310
       539    1450  FORMAT (1H ,2X,'A FACTOR OF ',F14.7,' HAS BEEN SPECIFIED TO CONVERMPT13320
                    1T USER HEIGHT UNITS TO METERS.')                                  MPT13330
       540    1460  FORMAT (1H0,T3,'OPTION   ',T16,'OPTION LIST',T86,'OPTION SPECIFICATMPT13340
                    1ION : 0= IGNORE OPTION'/1X,T68,' 1= USE OPTION'/T25,'TECHNICAL OPTMPT13350
                    2IONS'/1X,T7,I2,T16,'TERRAIN ADJUSTMENTS',T70,I1/1X,T7,I2,T16,'DO NMPT13360
                    3OT INCLUDE STACK DOWNWASH CALCULATIONS',T70,I1/1X,T7,I2,T16,'DO NOMPT13370
                    4T INCLUDE GRADUAL PLUME RISE CALCULATIONS',T70,I1/1X,T7,I2,T16,'CAMPT13380
                    5LCULATE INITIAL PLUME SIZE',T70,I1/1X,T25,'INPUT OPTIONS'/1X,T7,I2MPT13390
                    6,T16,'READ MET DATA FROM CARDS',T70,I1/1X,T7,I2,T16,'READ HOURLY EMPT13400
                    7MISSIONS',T70,I1/1X,T7,I2,T16,'SPECIFY SIGNIFICANT SOURCES',T70,I1MPT13410
                    8/1X,T7,I2,T16,'READ RADIAL DISTANCES TO GENERATE RECEPTORS',T70,I1MPT13420
                    9/T25,'PRINTED OUTPUT OPTIONS'/1X,T7,I2,T16,'DELETE EMISSIONS WITH MPT13430
                    AHEIGHT TABLE',T70,I1/1X,T7,I2,T16,'DELETE MET DATA SUMMARY FOR AVEMPT13440
                    B PERIOD',T70,I1/1X,T7,I2,T16,'DELETE HOURLY CONTRIBUTIONS',T70,I1/MPT13450
                    C1X,T7,I2,T16,'DELETE MET DATA ON HOURLY CONTRIBUTIONS',T70,I1/1X,TMPT13460
                    D7,I2,T16,'DELETE FINAL PLUME RISE CALC ON HRLY CONTRIBUTIONS',T70,MPT13470
                    EI1)                                                               MPT13480
       541    1470  FORMAT (1X,T7,I2,T16,'DELETE HOURLY SUMMARY',T70,I1/1X,T7,I2,T16,'MPT13490
                    1DELETE MET DATA ON HRLY SUMMARY',T70,I1/1X,T7,I2,T16,'DELETE FINALMPT13500
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                2 PLUME RISE CALC ON HRLY SUMMARY',T70,I1/1X,T7,I2,T16,'DELETE AVG-MPT13510
                3PERIOD CONTRIBUTIONS',T70,I1/1X,T7,I2,T16,'DELETE AVERAGING PERIODMPT13520
                4 SUMMARY',T70,I1/1X,T7,I2,T16,'DELETE AVG CONCENTRATIONS AND HI-5 MPT13530
                5TABLES',T70,I1/T25,'OTHER CONTROL AND OUTPUT OPTIONS'/1X,T7,I2,T16MPT13540
                6,'RUN IS PART OF A SEGMENTED RUN',T70,I1/1X,T7,I2,T16,'WRITE PARTIMPT13550
                7AL CONC TO DISK OR TAPE',T70,I1/1X,T7,I2,T16,'WRITE HOURLY CONC TOMPT13560
                8 DISK OR TAPE',T70,I1/1X,T7,I2,T16,'WRITE AVG-PERIOD CONC TO DISK MPT13570
                9OR TAPE',T70,I1/1X,T7,I2,T16,'PUNCH AVG-PERIOD CONC ONTO CARDS',T7MPT13580
                A0,I1)                                                          MPT13590
 542      1480  FORMAT (1H0,2X,'ANEMOMETER HEIGHT= ',F10.2/3X,'WIND PROFILE WITH MPT13600
                1,'HEIGHT EXPONENTS CORRESPONDING TO STABILITY ARE AS FOLLOWS: '/8X,MPT13610
                2'FOR STABILITY A: ',F4.2/12X,'STABILITY B: ',F4.2/12X,'STABILITY CMPT13620
                3: ',F4.2,/12X,'STABILITY D: ',F4.2,/12X,'STABILITY E: ',F4.2/12X,MPT13630
                4STABILITY F: ',F4.2)                                           MPT13640
 543      1490  FORMAT (1H0,'ANEMOMETER HEIGHT IS:',F10.2/1X,'EXPONENTS FOR POWER-MPT13650
                1 LAW WIND INCREASE WITH HEIGHT ARE: ',F4.2,5(',',F4.2)/' TERRAIN ADMPT13660
                2JUSTMENTS ARE: ',F5.3,5(',',F5.3)//)                           MPT13670
 544      1500  FORMAT ('1',T90,'POINT SOURCE INFORMATION'//1X,T5,'SOURCE',T23,'EAMPT13680
                1ST',T31,'NORTH',T39,'SO2(G/SEC)  PART(G/SEC)  STACK  STACK   STACKMPT13690
                2   STACK',3X,'POTEN. IMPACT',2X,'EFF',3X,'GRD-LVL BUOY FLUX'/1X,T2MPT13700
                33,'COORD',T31,'COORD','   EMISSIONS   EMISSIONS    HT(M) TEMP(K) DMPT13710
                4IAM(M)','VEL(M/SEC)(MICRO G/M**3) HT(M)',3X,'ELEV',6X,'F'/1X,T24,MPT13720
                5(USER UNITS)',T116,'USER HT M**4/S**3'/1X,T117,'UNITS'/)       MPT13730
 545      1510  FORMAT (1X,I3,1X,3A4,1X,2F9.2,2F12.2,4F8.1,6PF13.2,0PF9.2,2F9.2) MPT13740
 546      1520  FORMAT ('0',T3,'SIGNIFICANT ',A4,' POINT SOURCES'//1X,T8,'RANK',T2MPT13750
                12,'CHI-MAX',T33,'SOURCE NO.'/1X,T17,'(MICROGRAMS/M**3)'/1X)    MPT13760
                                                                                MPT13770
 547      1530  FORMAT (1X,T9,I3,T18,6PF12.2,T35,I3)
 548      1540  FORMAT (1X,'HEIGHT ABOVE 100M FOR POINT SOURCE',I4,3X,' HEIGHT= ',FMPT13780
                16.2,' (METERS)','   EMISSIONS=',F10.2,' (G/SEC)')              MPT13790
 549      1550  FORMAT ('0',4X,'TOTAL ',A4,' EMISSION AND CUMULATIVE FRACTION ACCOMPT13800
                1RDING TO HEIGHT'//1X,T12,'TOTAL POINT    CUMULATIVE '/1X,'HEIGHT(M)MPT13810
                2 EMISSIONS(G/S)   FRACTION'/1X)                                MPT13820
 550      1560  FORMAT (1X,T2,I2,' -',I3,T11,F8.2,T26,F7.3,T43,F8.2,T56,F7.3)   MPT13830
                                                                                MPT13840
 551      1570  FORMAT ('0',T2,'TOTAL',2X,F10.2)
 552      1580  FORMAT (1H0,21X,'ADDITIONAL INFORMATION ON SOURCES.')           MPT13850
 553      1590  FORMAT (1H0,'  USER SPECIFIED ',I3,' (NPT) SIGNIFICANT POINT ','SOMPT13860
                1URCES AS LISTED BY POINT SOURCE NUMBER: '/2X,25I5)             MPT13870
 554      1600  FORMAT ('0',2X,'EMISSION INFORMATION FOR ',I4,' (NPT) POINT SOUR',MPT13880
                1'CES HAS BEEN INPUT'/2X,I2,' SIGNIFICANT POINT SOURCES(NSIGP) ','AMPT13890
                2RE TO BE',' USED FOR THIS RUN'/2X,'THE ORDER OF SIGNIFICANCE(IMPS)MPT13900
                3 FOR 25 OR LESS POINT SOURCES USED IN THIS RUN AS LISTED BY POINT MPT13910
                4SOURCE NUMBER:'/2X,25I5)                                       MPT13920
 555      1610  FORMAT (2X,'SURFACE MET DATA FROM STATION(ISFCD) ',I6,', YEAR(ISFCMPT13930
                1YR) 19',I2/2X,'MIXING HEIGHT DATA FROM STATION(IMXD) ',I6,', YEAR(MPT13940
                2IMXYR) 19',I2)                                                 MPT13950
                                                                                MPT13960
 556      1620  FORMAT (1H0,T21,'RECEPTOR INFORMATION')
 557      1630  FORMAT (1H0,' MPTER INTERNALLY GENERATES 36 RECEPTORS ','ON A CIRCMPT13970
                1LE CORRESPONDING TO EACH NON-ZERO ','RADIAL DISTANCE FROM A CENTERMPT13980
                2 POINT '/1X,T10,'COORDINATES ARE (USER UNITS): (',F8.3,',',F8.3,')'MPT13990
                3/1X,T10,'RADIAL DISTANCE(S) USER SPECIFIED (USER UNITS): ',5(F11.3MPT14000
          4,'  ')                                                                       MPT14010
 1640     FORMAT (F8.1)                                                                 MPT14020
 1650     FORMAT ('0',' RECEPTOR    IDENTIFICATION  EAST      NORTH      RECEPMPT14030
         1TOR HT      RECEPTOR GROUND LEVEL'/1X,T30,'COORD',T39,'COORD    ABV LMPT14040
         2OCAL GRD LVL          ELEVATION'/1X,T31,'(USER UNITS)          (METERMPT14050
         3S)           (USER HT UNITS)'/1X)                                      MPT14060
 1660     FORMAT (1X,T7,I3,2A1,8X,2A4,F13.3,F10.3,F12.1,F20.1)                  MPT14070
 1670     FORMAT (1HO,T3,'* ONE ASTERISK INDICATES THAT THE ASSOCIATED ','REMPT14080
         1CEPTOR(S) HAVE A GROUND LEVEL ELEVATION LOWER ',' THAN THE LOWEST SMPT14090
         2OURCE BASE ELEVATION.'/' CAUTION SHOULD ',' BE USED IN INTERPRETINGMPT14100
         3 CONCENTRATIONS FOR THESE RECEPTORS.'/' **  TWO ASTERISKS ',' INDICMPT14110
         4ATE THAT THE ASSOCIATED RECEPTOR(S) HAVE GROUND LEVEL ',' ELEVATIONMPT14120
         5S ABOVE THE LOWEST STACK TOP.'/'    CONSEQUENTLY',' NO CALCULATIONMPT14130
         6S WILL BE PERFORMED WITH THIS RECEPTOR.A ','SERIES OF ASTERISKS WIMPT14140
         7LL INSTEAD APPEAR IN THE OUTPUT.')                                    MPT14150
 1680     FORMAT (//1X,' THE NUMBER OF    DAYS  PREVIOUSLY COMPLETED EQUAL ',MPT14160
         1I3,' AND THE LAST    DAY  TO BE COMPLETED IN THIS RUN IS ',I3)      MPT14170
 1690     FORMAT ('1INPUT MET DATA  ',I2,'/',I4/1X,T2,' HOUR    THETA     SPEEDMPT14180
         1   MIXING    TEMP       STABILITY'/1X,T9,' (DEG)      (M/S)  HEIGHT(M) (MPT14190
         2DEG-K)  CLASS'/1X)                                                   MPT14200
 1700     FORMAT (1X,T7,I2,4F9.2,6X,I1)                                        MPT14210
 1710     FORMAT ('0','RESULTANT MET CONDITIONS'/1X)                           MPT14220
 1720     FORMAT (2X,'WIND DIRECTION=',F7.2,T36,'RESULTANT WIND SPEED=',F7.2MPT14230
         1/2X,'AVERAGE WIND SPEED=',F7.2,T36,'AVERAGE TEMP=',F7.2/2X,'WIND PMPT14240
         2ERSISTENCE=',F6.3,T36,'MODAL STABILITY=',I2)                       MPT14250
 1730     FORMAT (1HO,' THIS SEGMENT OF A SEGMENTED RUN HAS COMPLETED ',I5,' MPT14260
         1(IDAY) DAYS.')                                                       MPT14270
 1740     FORMAT ('0',T9,'        RECEPTORS'//1X,'RECEPTOR     IDENTIFICATION  MPT14280
         1EAST       NORTH       RECEPTOR HT       RECEPTOR GROUND LEVEL',T99,'AVGMPT14290
         2 CONC FOR PERIOD'/1X,T30,'COORD',T39,'COORD    ABV LOCAL GRD LVL     MPT14300
         3    ELEVATION',T98,'DAY',F4.0,'HR',F3.0,' TO DAY',F4.0,'HR',F3.0/1XMPT14310
         4,T31,'(USER UNITS)          (METERS)            (USER HT UNITS)',T100,MPT14320
         5(MICROGRAMS/M**3)'/1X)                                               MPT14330
 1750     FORMAT (1X,T7,I3,1X,2A4,5X,F8.2,2X,F8.2,F10.1,F20.1,T110,A1,6PF7.MPT14340
         12)                                                                   MPT14350
 1760     FORMAT (1HO,T41,'FIVE HIGHEST ',I2,'-HOUR ',A4,' CONCENTRATIONS((EMPT14360
         1NDING ON JULIAN DAY, HOUR)'/1X,T55,'(MICROGRAMS/M**3)'//2X,'RECEPTMPT14370
         2OR ',T78,4(I1,20X),I1,/1X)                                            MPT14380
 1770     FORMAT (1H ,2X,I3,'(',F7.2,',',F7.2,')',2(1X,A1,6PF9.2,2X,'(',I3,',MPT14390
         1',I2,')'),3(2X,6PF9.2,2X,'(',I3,',',I2,')'))                       MPT14400
       C                                                                        MPT14410
          END                                                                   MPT14420
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                                   MPTER - VERSION 79365

SYMBOL     = = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = = =

1          -    38RD
10         -    23      25*
20         -    30      31*
30         -    28      32*
40         -    26      33*
50         -    39      42*
60         -    48      51*
70         -    50      53*
80         -    53      59*
90         -    59      63*
100        -    63      66*
110        -    69      72*
120        -    73      75*
130        -    74      77*
140        -    71      76      79*
150        -    81*    115
160        -    82      87*
170        -    89      93*
180        -    96      99*
190        -   100     103*
200        -    98     102     104*
210        -   105     107*
220        -   106     109*
230        -    84      88     116*
240        -   117     120*
250        -   124     125     129*
260        -   122     131*
270        -   133     135*
280        -   120     136*
290        -   138     141*
300        -   140     144*
310        -   143     145*
320        -   137     146*
330        -   153     159*
340        -   136     161*
350        -   165     168*
360        -   173     175*
370        -   162     168     177*
380        -   177     178*
390        -   172     176     179*
400        -   181     182*
410        -   180     183*
420        -   183     185*
430        -   189     192*
440        -   192     195*
450        -   186     196*
460        -   201     202     204*
470        -   210     218*
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                                   MPTER - VERSION 79365

     480     -     206     219*
     490     -     224     227*
     500     -     227     230*
     510     -     222     231*
     520     -     198     221     232*     280
     530     -     234 RD  236*
     540     -     233     238*
     550     -     235     239     241*
     560     -     243     246*
     570     -     242     247*
     580     -     247     250*
     590     -     251     252*
     600     -     253     255*
     610     -     255     258     261      264*
     620     -     269     270*
     630     -     267     272*
     640     -     266     271     274*
     650     -     277     278*
     660     -     275     280*
     670     -     274     279     282*
     680     -     285     286*
     690     -     282     283     287*
     700     -     289     290*
     710     -     288     291*
     720     -     292*    445     447
     730     -     297     299*
     740     -     298     301*
     750     -     302     306*
     760     -     295     307*
     770     -     309     312*    450      453
     780     -     316     317*
     790     -     321     323     329*
     800     -     318     330     345*
     810     -     355     357     360*
     820     -     363     365*
     830     -     364     367*
     840     -     368     369*
     850     -     366     371*
     860     -     346     373*
     870     -     373     376*
     880     -     378     379*
     890     -     376     380*
     900     -     381     383*
     910     -     385     388*
     920     -     390     391*
     930     -     388     392*
     940     -     402     405     408*
     950     -     409     411*
     960     -     414     415*
     970     -     413     416*
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                          WPTFR - VERSION 79365

    980     -    420     423*
    990     -    424     427*
   1000     -    428     431*
   1010     -    412     431       433       434*
   1020     -    383     436       438*
   1030     -    444     448*
   1040     -    446     454*
   1050     -    443     457*
   1060     -    458     461*
   1070     -    467     469       472*
   1080     -    475     476*
   1090     -    484     487*
   1100     -    483     487       490*
   1110     -    496     497*
   1120     -    495     499*
   1130     -    478     502*
   1140     -    456     457       503*
   1150     -    503     506*
   1160     -    506     509*
   1170     -    509     512*
   1180     -     36RD   513*
   1200     -     83RD   234RD     514*
   1210     -     87RD   515*
   1220     -    163RD   516*
   1230     -    223RD   517*
   1240     -    238RD   518*
   1250     -     40WR   519*
   1260     -     77WR   520*
   1270     -     85WR   521*
   1280     -    118WR   522*
   1290     -    166WR   523*
   1300     -    169WR   524*
   1310     -    190WR   525*
   1320     -    193WR   526*
   1330     -    225WR   527*
   1340     -    236WR   528*
   1350     -    248WR   529*
   1360     -    262WR   530*
   1370     -    299WR   531*
   1380     -    310WR   532*
   1390     -    406WR   533*
   1400     -     37WR   462WR     534*
   1410     -     45WR   535*
   1420     -     49WR   536*
   1430     -     51WR   537*
   1440     -     58WR   538*
   1450     -     60WR   539*
   1460     -     66WR   540*
   1470     -     67WR   541*
   1480     -     70WR   542*
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     1490     -     72WR    543*
     1500     -     79WR    544*
     1510     -    114WR    545*
     1520     -    132WR    546*
     1530     -    134WR    547*
     1540     -    142WR    548*
     1550     -    147WR    549*
     1560     -    152WR    158WR    550*
     1570     -    160WR    551*
     1580     -    161WR    552*
     1590     -    164WR    553*
     1600     -    179WR    554*
     1610     -    195WR    555*
     1620     -    197WR    556*
     1630     -    205WR    557*
     1640     -    215      558*
     1650     -    250WR    559*
     1660     -    252WR    560*
     1670     -    254WR    561*
     1680     -    257WR    562*
     1690     -    331WR    563*
     1700     -    333WR    564*
     1710     -    371WR    565*
     1720     -    372WR    566*
     1730     -    455WR    567*
     1740     -    474WR    568*
     1750     -    476WR    569*
     1760     -    493WR    570*
     1770     -    498WR    571*
     A        -    110=     112
A             UMMY VARIABLE
     ANAME    -       8DI      14DA     218
ANAME(36)   ALPHANUMERIC INDICATORS FOR EACH 10 DEGREES OF AZIMUTH
     ANGARC   -    389
ANGARC      SUBROUTINE TO DETERMINE THE PROPER ARCTANGENT
     ATIME    -       9DI      15DA     57=      498
ATIME         OPTIONAL AVERAGING TIME FOR HIGH-FIVE TABLE
     B        -    111=     112
B             DUMMY VARIABLE
     BLNK     -      10DA     459      460      477      500      501
BLNK          AN ALPHANUMERIC BLANK
     CELM     -       5CO      38RD     40WR     90
CELM        MULTIPLIER TO CONVERT USER HEIGHT UNITS TO METERS.
     CENTX    -    199RD    205WR    212
CENTX       EAST COORDINATE ABOUT WHICH POLAR COORDINATE RECEPTORS ARE CENTERED (USER UNITS).
     CENTY    -    199RD    205WR    213
CENTY       NORTH COORDINATE ABOUT WHICH POLAR COORDINATE RECEPTORS ARE CENTERED (USER UNITS).
     CONC     -       7CO      29=      415=     415
CONC(180,5)   CUMULATIVE SUMS OF CONCENTRATION FOR AVERAGING TIMES
     CONONE   -      38RD     43
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                                        MPTER - VERSION 79365

CONONE     MULTIPLIER CONSTANT TO CONVERT LENGTH IN USER UNITS TO KM
     CONTER  -       8DI     68RD     72WR     74       78       401
CONTER(6)  TERRAIN ADJUSTMENT FACTORS FOR EACH STABILITY.
     CONTWO  -       5CO     43=      45WR
CONTWO     MULTIPLIER CONSTANT TO CONVERT LENGTH IN USER UNITS TO KM. THIS IS SAME AS CONONE.
     COS     -   209     335      400
COS        LIBRARY FUNCTION
     COSRAD  -   209=    213
COSRAD     COSINE OF 10 DEGREE AZIMUTHS
     COST    -       5CO     335=     339      400=
COST       COSINE OF WIND DIRECTION FOR THIS HOUR
     CTER    -       5CO     401=
CTER       TERRAIN ADJUSTMENT FACTOR FOR THIS HOUR.
     D       -       93=     94       98
D          STACK TOP INSIDE DIAMETER
     DAY     -   293=    298
DAY(5)     BEGINNING JULIAN DAY FOR AN AVERAGING TIME.
     DAY1    -   296RD   298      301      322RD    326      387
DAY1       JULIAN DAY OF MET DATA.
     DAY1A   -       46=     259RD    454WR    478WR
DAY1A      BEGINNING JULIAN DAY FOR LENGTH OF RUN.
     DAY2    -   320=    328=     478WR
DAY2       ENDING JULIAN DAY FOR LENGTH OF RUN.
     DELH    -       4CO
DELH       PLUME RISE.
     DELM    -   315=    339=     339      348=     348      349      352      352
DELM       EAST  COMPONENT OF RESULTANT WIND FOR NAVG HOURS.
     DELN    -   314=    340=     340      347=     347      349      352      352
DELN       NORTH COMPONENT OF RESULTANT WIND FOR NAVG HOURS.
     DSAV    -       3CO     112=     114WR    125      126      131=
DSAV(250)  ARRAY OF DISTANCES TO FINAL RISE(KM)
     DUM     -       83RD    88       234RD    235      494=     497
DUM         DUMMY VARIABLE
     DUMP    -       8DI     296RD
DUMR(28) DUMMY VARIABLE TO SKIP PAST WIND DIRECTION TO 10 DEGREES.
     ELHN    -       5CO     61=      91       91=      284      285
ELHN       ELEVATION OF LOWEST STACK TOP IN INVENTORY, IN USER HEIGHT UNITS.
     ELOW    -       62=     92       92=      284
ELOW        GROUND-LEVEL ELEVATION OF SHORTEST STACK
     ELP     -       5CO     87RD     90       92       92       114WR
ELP(NPT)  SOURCE GROUND-LEVEL ELEVATION (USER HEIGHT UNITS).
     ELR     -       3CO     217=     230=     238RD    284      284      285      252WR    476WR
ELR(180) RECEPTOR GROUND-LEVEL ELEVATION (USER HEIGHT UNITS).
     ELPDUM  -       9DI     223RD    230
ELPDUM(5)   RECEPTOR ELEVATIONS FOR AN AZIMUTH FOR UP TO FIVE DISTANCES (USER HEIGHT UNITS).
     ENDP    -       12DA    84       88
ENDP        ALPHANUMERIC FIELD TO CHECK AGAINST WORDS END P AND ENDR.
     ENDR    -       12DA    235      239
ENDR        ALPHANUMERIC FIELD TO CHECK FOR END OF RECEPTOR INPUT
     EXPOS   -       1CO
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                                   MPTER - VERSION 79365

EXPOS     COMMON BETWEEN MAIN AND BLOCK DATA
    F        -     99=     100     101     103     114WR
F         BRIGGS BUOYANCY FLUX PARAMETER
    FLOAT    -   207     370     370
FLOAT     LIBRARY FUNCTION
    H        -      4CO
H         EFFECTIVE POINT SOURCE HEIGHT(METERS)
    HAFL     -     38RD    48      51WR    52
HAFL      POLLUTANT HALF-LIFE (SECONDS)
    HANE     -      5CO    68RD    70WR    72WR
HANE      ANEMOMETER HEIGHT (METERS)
    HC       -   139=    140
HC        TEMPORARY HEIGHT CLASS AT 5 METER INTERVALS
    HC1      -      1CO   106
HC1(10)   HEIGHT CLASS DESIGNATIONS FOR RAMBLK DATA
    HF       -     97=    101=    103=    104     106     112
HF        FINAL PLUME RISE(METERS) FOR CURRENT POINT SOURCE
    HI1      -   481=    484     485=
HI1       HIGHEST CONCENTRATION FOR AVERAGING TIME.
    HI2      -   482=    487     488=
HI2       SECOND HIGHEST CONCENTRATION FOR AVERAGING TIME.
    HIMAX    -   465=    469     471=
HIMAX     HIGHEST AVERAGE CONCENTRATION.
    HL       -      4CO   395=
HL        MIXING HEIGHT(METERS) FOR THIS HOUR
    HLH      -      4DI   296RD   306
HLH(2,24)  RURAL AND URBAN MIXING HEIGHTS (METERS) FOR 24 HOURS
    HMAXA    -      7CO    31=    259RD   454WR   481     482     484     485     487     488
                 497=    497     498WR   498WR
HMAXA(3,5,180,5) HIGHEST FIVE CONCS. AND ASSOCIATED DAY AND HR. FOR EACH RECEPTOR, FOR DIF. AVERAGING TIMES.
    HR1      -     47=    259RD   454WR   470WR
HR1       BEGINNING HOUR FOR LENGTH OF RUN.
    HR2      -   463=    474WR
HR2       ENDING HOUR FOR LENGTH OF RUN.
    HSAV     -      3CO   104=    114WR
HSAV(250)  ARRAY OF PLUME RISES ALREADY CALCULATED(METERS)
    I        -     23      24      25      26      27      29      31      40RD    44RD    66WR
                   66WR    66WR    67WR    67WR    67WR    73      74      76      87RD    87RD
                   87RD    87RD    122     129     130     133     134WR   134WR   134WR   137
                 140     142WR   142WR   142WR   144     145     153     154     156     157
                 157     158WR   163RD   163RD   164WR   164WR   173     174     177     178
                 178     179WR   179WR   181     182     182     183     184     185     206
                 207     211     218     222     224     225WR   229     240     273WR   273WR
                 277     281WR   281WR   285     289     316     317     318     319     323
                 331     355     356     359     363     364     368     370     382WR   382WR
                 382WR   382WR   390     391     408RD   408RD   410WR   410WR   493WR   493WR
I         DUMMY VARIABLE FREQUENTLY USED
    ID       -   188RD   189     190WR
ID        SURFACE METEOROLOGICAL STATION IDENTIFICATION FROM DISK
    IDATE    -      3CO    38RD    38RD    45WR    45WR    46      287     297     299WR   299WR
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                         MPTER - VERSION 79365

                301=    320     324=    327=    328     331WR   387=    403     403     410WR
                417     439=
IDATE(2) YEAR AND STARTING JULIAN DAY TO APPEAR ON OUTPUT.
     IDATP   -  404RD   405     406WR
IDATP    DATE(YYDDDHH) ON HOURLY POINT SOURCE EMISSION RECORD
     IDAY    -  256RD   257WR   258     261     262WR   264     267     268     275     283
                284     287=    288     289     292=    292     293     299WR   446     454WR
                455WR
IDAY     NUMBER OF DAYS PREVIOUSLY PROCESSED BY A PRECEDING RUN.
     IDAYS   -  259RD   261     262WR
IDAYS    DATE OF LAST DAY PROCESSED AND WRITTEN TO SUMMARY INFO FILE
     IDCK    -  403=    405     406WR
IDCK     INTERNAL DATE USED FOR CHECKING DATE ON HOURLY EMISSION
     IDM     -  188RD   192     193WR
IDM      IDENTIFICATION FOR RADIOSONDE STATION USED TO DETERMINE MIXING HEIGHT FROM DISK.
     IDUM    -  223RD   224     225WR
IDUM     AZIMUTH INDICATOR
     IFREQ   -     8DI     10DA    317=    348=    348     356     364     369
IFREQ(7) FREQUENCY TABLE OF OCCURRENCE OF EACH STABILITY CLASS.
     IH      -  105     106     108=    109
IH       DO INDEX TO DETERMINE HEIGHT INDEX
     IH1     -  148=    152WR   155=    158WR
IH1      HEIGHT VALUES FOR TABLE OUTPUT
     IH2     -  149=    152WR   154=    155     158WR
IH2      HEIGHT VALUES FOR TABLE OUTPUT
     IHR     -     7CO     404WR   408WR
IHR      ENDING HOUR FOR HIGH-FIVE CONCENTRATION
     IHSTRT  -     38RD    45WR    47      307     310WR   325=    374     375
IHSTRT   START HOUR OF RUN
     IKST    -     6CO     296RD   303     308=    322RD   329     329=    333WR   343     397
IKST(24) ARRAY OF 24 STABILITY CLASSES.
     ILH     -  383     388     396
ILH      DO LOOP INDEX ON HOUR LOOP
     IM1     -  150=    156=    157
IM1      DUMMY VARIABLE FOR EMISSIONS WITH HEIGHT TABLE.
     IMO     -  296RD
IMO      MONTH ON MET DATA.
     IMPS    -     8DI     129=    134WR   170     178
IMPS(25) ARRAY OF ORIGINAL POINT SOURCE NUMBERS IN ORDER OF SIGNIFICANCE
     IMXD    -  187RD   192     193WR   195WR
IMXD     IDENTIFICATION FOR RADIOSONDE STATION USED TO DETERMINE MIXING HEIGHT. FROM CARD INPUT.
     IMXYR   -  187RD   192     193WR   195WR
IMXYR    YEAR FOR MIXING HEIGHT DATA - 2 DIGITS FROM CARD INPUT.
     IN      -     34=     36RD    38RD    48RD    68RD    83RD    97RD    147RD   187RD   199RD
                223RD   234RD   238RD   256RD   322RD
IN       INPUT UNIT NUMBER(5) - CARD READER.
     INPT    -  163RD   163RD   164WR   164WR   165     166WR   168     169     170
INPT     THE NUMBER OF USER SPECIFIED SIGNIF. POINT SOURCES. COUNT
     IO      -     6CO     35=     37WR    40WR    45WR    49WR    51WR    58WR    60WR    66WR
                67WR    70WR    72WR    77WR    79WR    85WR    114WR   118WR   132WR   134WR
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                              MPTER - VERSION 79365

                   142WR   147WR   152WR   158WR   160WR   161WR   164WR   166WR   169WR   179WR
                   190WR   193WR   195WR   197WR   205WR   225WR   236WR   248WR   250WR   252WR
                   254WR   257WR   262WR   299WR   310WR   331WR   333WR   371WR   372WR   406WR
                   455WR   462WR   474WR   476WR   493WR   498WR
IO        UNIT NUMBER(6) - PRINTER OUTPUT
    IOPT    -       2CO     44RD    57      59      64=     65=     66WR    67WR    69      89
                   136     162     180     186     198     221     242     253     255     265
                   266     274     282     288     295     321     330     346     373     381
                   402     409     432     436     436     445     457     503     506     509
IOPT(25)  OPTIONS (SEE INPUT CARD 5.)
    IP      -      42=     45WR    172WR   187WR   493WR
IP        DUMMY VARIABLE USED FOR PROPER POLLUTANT TITLE
    IP1     -      361=    363
IP1       DUMMY VARIABLE USED IN DETERMINING MODAL STABILITY
    IPOL    -      3CO     38RD    42      112     142WR   144     145     182     404RD
IPOL      INDEX FOR POLLUTANT, 3 = SO2 , 4 = PARTICULATE.
    IPSIGS  -      5CO     113=    185=
IPSIGS(250)  ARRAY CONTAINING RANK FOR EACH POINT SOURCE IN TERMS OF SIGNIFICANCE.
    IQ      -      302     303     303     304     304     305     305     306     306     306
IQ        LOOP INDEX FOR MET DATA
    IRANK   -      6CO
IRANK(180)  RANK OF CONCENTRATION FOR THIS RECEPTOR.
    IS      -      109=    110     111
IS        HEIGHT CLASS INDEX.
    ISFCD   -      187RD   189     190WR   195WR
ISFCD     SURFACE METEOROLOGICAL STATION IDENTIFICATION - FROM CARD INPUT.
    ISFCYR  -      187RD   189     190WR   195WR
ISFCYR    YEAR FOR SURFACE DATA - 2 DIGITS. FROM CARD INPUT.
    ISKIP   -      268=    269     276=    277     284=    285
ISKIP     NUMBER OF RECORDS TO BE SKIPPED
    ISTDAY  -      326=    327     439
ISTDAY    START DAY OF CURRENT AVERAGING PERIOD
    IYEAR   -      188RD   189     190WR
IYEAR     YEAR FOR SURFACE DATA - 2 DIGITS. FROM DISK.
    IYM     -      188RD   192     193WR
IYM       YEAR FOR MIXING HEIGHT DATA - 2 DIGITS FROM DISK.
    J       -      28      29      31      114WR   114WR   124     125     126     127     138
                   139     144     144     152WR   152WR   158WR   158WR   170=    172     173
                   184=    185     201     202     210     211     212     213     215     223RD
                   223RD   227     228     230     238RD   238RD   243     244     244     244
                   245     245     252WR   252WR   273WR   273WR   281WR   281WR   368     369
                   369     458     459     460     476WR   476WR   496     497     497     498WR
                   498WR   498WR   498WR   498WR   498WR   498WR   498WR   498WR
J         DUMMY VARIABLE FREQUENTLY USED
    JA      -      200=    203=    203     210     220     223RD   227
JA        DUMMY VARIABLE FOR GENERATING POLAR COORDINATE RECEPTORS.
    JDAY    -      7CO     417=
JDAY      DATE WHICH CONCENTRATION HAS BEEN CALCULATED
    JHR     -      319=    322RD   322RD   322RD   322RD   322RD   322RD   325     329     329
                   332     333WR   333WR   333WR   333WR   333WR   333WR   336     341     343
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                         MPTER - VERSION 79365

JHR      HOUR SUBSCRIPT USED WITH MET DATA
    JYR    -   296RD   297     299WR   322RD   328
JYR      YEAR OF MET DATA.
    K      -   30      31      114WR   118WR   171=    174     175=    175     228=    229
               251     252WR   252WR   252WR   252WR   252WR   252WR   252WR   252WR   376
               377     379     388     389     391     413     415     415     415     416
               416     416     467     468     468     469     470     471     475     476WR
               476WR   476WR   476WR   476WR   476WR   476WR   476WR   483     484     485
               486     487     488     489     495     497     497     498WR   498WR   498WR
               498WR   498WR   498WR   498WR   498WR   498WR   498WR
K        DUMMY VARIABLE FREQUENTLY USED
    K1     -   479=    486=    491     500
K1       DUMMY VARIABLE FOR STORING ASTERISK.
    K2     -   480=    489=    492     501
K2       DUMMY VARIABLE FOR STORING ASTERISK.
    KMX    -   466=    470=    473     477
KMX      DUMMY VARIABLE FOR STORING ASTERISK.
    KST    -     4CO   343=    344     348     362=    370=    372WR   397=    401
KST      STABILITY CLASS FOR THIS HOUR.
    KSUM   -   367=    369=    369     370
KSUM     VARIABLE USED IN DETERMINING AVERAGE  STABILITY
    L      -   229=    230     410     415     415     478     481     482     484     485
               487     488     493WR   494     497     497     498WR   498WR   498WR   498WR
               498WR   498WR
L        DUMMY VARIABLE USED IN PRINTING POINT IDENTIFICATION
    LDRUN  -   256RD   257WR   446
LDRUN    DAY NUMBER OF LAST DAY TO BE PROCESSED IN THIS RUN
    LH     -     3CO   384=    385     386=    387     393     394     395     396     397
               403     410WR
LH       INDEX USED FOR SUBSCRIPTING DATA IN HOUR LOOP
    LINE1  -     6CO    36RD    37WR   265WR   272WR   280WR   462WR
LINE1(14)  FIRST LINE OF TITLE - USUALLY IDENTIFIES USER AND AFFILIATION.
    LINE2  -     6CO    36RD    37WR   265WR   272WR   280WR   462WR
LINE2(14)  SECOND LINE OF TITLE - CAN IDENTIFY EMISSIONS SOURCE AND DATE.
    LINE3  -     6CO    36RD    37WR   265WR   272WR   280WR   462WR
LINE3(14)  THIRD LINE OF TITLE - CAN INDICATE METEOROLOGICAL DATA LOCATION AND PERIOD OF RECORD.
    LMAX   -   127=    129     131
LMAX     TEMPORARY NUMBER OF SOURCE WITH HIGHTEST CONCENTRATION
    LSMAX  -   354=    357     358=    360
LSMAX    MAXIMUM STABILITY CLASS FREQUENCY.
    LST    -   356=    357     359
LST      VARIABLE USED IN DETERMINING MODAL STABILITY
    LSTAB  -   359=    361     362
LSTAB    VARIABLE USED IN DETERMINING MODAL STABILITY
    MAXP   -   13DA    82      85WR
MAXP     MAXIMUM NUMBER OF POINT SOURCES, SECOND DIM. OF SOURCE
    MO     -     6CO
MO       COMMON BETWEEN MAIN AND OUTHP
    MOD    -   386     451
MOD      LIBRARY FUNCTION
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     MP       -     5CO
MP          COMMON BETWEEN MAIN AND PTR
     MPO      -     3CO
MPO         COMMON BETWEEN MAIN, PTR, AND OUTHR
     MPOR     -     2CO
MPOR        COMMON BETWEEN MAIN, PTR, OUTHR, AND RCP
     MPR      -     4CO
MPR         COMMON BETWEEN MAIN, PTR, AND RCP
     MPS      -     6CO    163RD   168WR   169     170=    178=    178WR   198
MPS(25)     POINT SOURCE NUMBERS USER WANTS TO CONSIDER AS SIGNIFICANT
     MO       -     7CO
MR          COMMON BETWEEN MAIN AND RANK
     NAV5     -     38RD   55      55      55      55      55      56      57      433
NAV5        ADDITIONAL AVERAGING-TIME FOR HIGH-FIVE TABLE (2, 4, 6, OR 12).
     NAVG     -     7CO    38RD    45WR    264     265WR   272WR   280WR   308     347     348
                    350    351     370     375     442     448     449     452
NAV6        NUMBER OF HOURS IN THE AVERAGING PERIOD.
     NAVT     -     54=    55=     58WR    410     431     438
NAVT        NUMBER OF AVERAGING TIMES TO BE CONSIDERED.
     NB       -     7CO    307=    308     309     318     323     378     378=    383     448=
                    448    450     451=    451     452     463
NB          THE BEGINNING HOUR OF THE CURRENT AVERAGING TIME LOOP
     NDAY     -     7CO    409WR   408WR
NDAY        DAY THAT HIGH-FIVE CONCENTRATION OCCURS ON
     NE       -     308=   318     375=    383     430     449=    449     452=
NE          THE ENDING HOUR OF THE CURRENT LOOP
     NHR      -     19=    259RD   411=    411     459WR   464     468
NHR         TOTAL NUMBER OF HOURS PROCESSED.
     NHRS     -     294=   442=    442     444
NHRS        COUNT ; USED TO DETERMINE WHEN A DAY (24 HOURS) IS COMPLETE
     NP       -     17=    264=    274     441=    441     443
NP          CURRENT NUMBER OF COMPLETED PERIODS
     NP24     -     21=    427=    427     428     430=
NP24        COUNT OF HOURS PROCESSED IN 24-HOUR AVERAGING TIME.
     NP3      -     19=    419=    419     420     422=
NP3         COUNT OF HOURS PROCESSED IN 3-HOUR AVERAGING TIME.
     NP8      -     20=    423=    423     424     426=
NP8         COUNT OF HOURS PROCESSED IN 8-HOUR AVERAGING TIME.
     NPER     -     38RD   45WR    265WR   272WR   280WR   443
NPER        THE NUMBER OF AVERAGING PERIODS TO BE RUN.
     NPT      -     7CO    80=     81=     81      82      87RD    87RD    87RD    88      90
                    90     92      92      93      94      94      95      97      99      101
                    107    108     112     112     113     114WR   114WR   114WR   114WR   114WR
                    114WR  116=    116     117     118WR   121     121     128     137     179WR
                    181    382WR   408RD
NPT         NUMBER OF POINT SOURCES, COUNT
     NPX      -     22=    432=    432     433     435=
NPX         COUNTER FOR OPTIONAL HIGH-FIVE AVERAGING TIME
     NR       -     7CO
NR          IN COMMON WITH SUBROUTINE RANK
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                         MPTER - VERSION 79365

      NRECEP  -     3CO    16=    196-   211=   212    213    214    215    216    217
                  220=   232=   232    233    238RD  238RD  238RD  238RD  239RD  239
                  241=   241    243    247    248WR  251    273WR  273WR  273WR  281WR
                  281WR  281WR  376    382WR  382WR  382WR  388    410WR  413    458
                  467    475    483    495
NRECEP   TOTAL NUMBER OF RECEPTORS
      NSIGP   -     6CO    38RD   39     40WR   45WR   63     120    121    121=   122
                  133    165    166WR  172    173    177    179WR  179WR  183
NSIGP    NO. OF SIGNIFICANT POINT SOURCES.
      NTIME   -     9DI    15DA   56=    493WR
NTIME(5) LENGTH OF AVERAGING TIMES, IN HOURS.
      OUTAVG  -   480
OUTAVG    ENTRY POINT IN OUTHR
      OUTHR   -   477
OUTHR     SUBROUTINE FOR OUTPUT
      PCHI    -     3CO    377=
PCHI(180)  CONCENTRATION FOR AVERAGING PERIOD AT EACH RECEPTOR IN GRAMS PER CUBIC METER.
      PERSIS  -   353=   372WR
PERSIS    WIND PERSISTENCE FOR NAVG HOURS. (RESULTANT SPEED/AVG. SPEED)
      PHCHI   -     3CO    389=   410WR  415    416
PHCHI(180)  SAME AS PCHI  BUT FOR THIS HOUR ONLY.
      PHSIGS  -     3CO    391=
PHSIGS(180,26)  SAME AS PSIGS BUT FOR THIS HOUR ONLY.
      PL      -     5CO    68RD   70WR   72WR
PL(6)     EXPONENTS FOR WIND PROFILE FOR EACH STABILITY CLASS.
      PNAME   -     8DI    87RD   88     114WR
PNAME(2,250)  12 CHARACTER POINT SOURCE IDENTIFICATION.
      PSAV    -     5CO    130=   134WR  182=
PSAV(250)  ORIGINAL ANNUAL EMISSION RATE FOR ALL SOURCES.
      PSIGS   -     3CO    379=
PSIGS(180,26)  PARTIAL CONC. DUE TO EACH SIGNIF. POINT SOURCE AT
                 EACH RECEPTOR FOR AVERAGING PERIOD.
      PTR     -   408
PTR          SUBROUTINE TO CALC CONC FROM POINT SOURCES
      PXUCOF  -     1CO    110
PXUCOF(6,9)  POINT SOURCE CONCENTRATION COEFFICIENTS FROM RAMBLK
      PXUEXP  -     1CO    111
PXUEXP(6,9)  POINT SOURCE CONCENTRATION EXPONENTS FROM RAMBLK
      QHL     -     6CO    306=    322RD   333WR   395
QHL(24)   ARRAY OF 24 HOURLY MIXING HEIGHTS(METERS).
      QTEMP   -     6CO    296RD   322RD   333WR   381     396
QTEMP(24)   ARRAY OF 24 AMBIENT AIR TEMPERATURES(KELVIN)
      QTHETA  -     6CO    296RD   304-    304     305     305-    305     322RD   332     333WR
                  393
QTHETA(24)   ARRAY OF 24 WIND DIRECTIONS (DEGREES)
      QU      -     6CO    296RD   322RD   333WR   336     394
QU(24)    ARRAY OF 24 WIND SPEEDS (METERS/SECOND)
      RADIK   -   207=    208     209
RADIK     AZIMUTH ANGLE IN RADIANS TO GENERATE POLAR COORDINATE
             RECEPTORS.
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                                   MPTER - VERSION 79365

      RADIL     -      8DI    199RD    202      205WR    212      213      215
RADIL(5)  RADIAL DISTANCES TO GENERATE POLAR COORDINATE RECEPTORS (USERS UNITS)
      RANK      -    418     421     425     429     438
RANK        SUBROUTINE TO RANK CONCENTRATIONS
      RC        -      4CO
RC          RELATIVE CONCENTRATION, CHI/Q.
      RNAME     -      6CO    214=     215      238RD    239      252WR    476WR
RNAME(2,180)  8 DIGIT ALPHANUMERIC DESCRIPTOR OF RECEPTOR.
      RREC      -      3CO    212=     238RD    252WR    273WR    281WR    392WR    475WR    498WR
RREC(180)   EAST COORDINATE OF RECEPTOR (USER UNITS).
      SIGMAX  -    123=     125      126=     130
SIGMAX     DUMMY VARIABLE TO RANK SOURCE IMPACT.
      SIN       -    208      338      339
SIN         LIBRARY FUNCTION
      SINRAD  -    208=     212
SINRAD      SINE OF 10 DEGREE AZIMUTHS
      SINT      -      5CO    334=     337      399=
SINT        SIN OF WIND DIRECTION FOR THIS HOUR
      SOURCE  -      5CO     87RD     90       93       94=      94       95       97       99      101
                     103     112      114WR    130      132WR    142WR    188      195      198     408RD
SOURCE(1,NPT)  EAST  COORDINATE OF POINT SOURCE (USER UNITS)
SOURCE(2,NPT)  NORTH COORDINATE OF POINT SOURCE (USER UNITS)
SOURCE(3,NPT)  SULFUR DIOXIDE EMISSION RATE (GRAMS/SECOND)
SOURCE(4,NPT)  PARTICULATE EMISSION RATE (GRAMS/SECOND)
SOURCE(5,NPT)  PHYSICAL STACK HEIGHT (METERS)
SOURCE(6,NPT)  STACK GAS TEMPERATURE (KELVIN)
SOURCE(7,NPT)  STACK INSIDE TOP DIAMETER (METERS)
SOURCE(8,NPT)  STACK GAS EXIT VELOCITY (METERS/SECOND)
SOURCE(9,NPT)  BRIGGS F WITHOUT TEMP, THAT IS: 3.12139*VF
      SQRT      -    352
SQRT        LIBRARY FUNCTION
      SREC      -      3CO    213=     238RD    252WR    273WR    281WR    392WR    475WR    498WR
SREC(180)   NORTH COORDINATE OF RECEPTOR (USER UNITS).
      STAR      -      6CO    130A     244=     245=     252WR    252WR    459=     460=     473=     476WR
                     477=    491=     492=     498WR    500=     501=
STAR(5,180)   ARRAY TO STORE ASTERISKS TO INDICATE RECEPTORS WITH
              HIGHEST AND SECOND HIGHEST CONCENTRATIONS.
      STR       -    130A     244      245      473      491      492
STR         AN ALPHANUMERIC ASTERISK.
      SUM       -      9DI     27=     259RD    416=     416      454WR    460=     460      465      468=
                     468     469      471      476WR
SUM(180)  AN ARRAY TO CALCULATE AVERAGE CONCENTRATION.
      SY        -      4CO
SY          SIGMA Y, STANDARD DEVIATION OF CONCENTRATION IN THE
             CROSSWIND DIRECTION(METERS)
      SZ        -      4CO
SZ          SIGMA Z, STANDARD DEVIATION OF CONCENTRATION IN THE
             VERTICAL DIRECTION(METERS)
      TABLE   -      8DI     24=      25=      144=     144      145=     146      151=     151      151
                     152WR   157=     157      157      157      158WR    160WR
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                              MPTER - VERSION 79365

TABLE(2,21)  ARRAY CONTAINING FREQUENCY DISTRIBUTIONS
    TEMP    -      5CO   313=    341=    341     351=    351     372WR   396=
TEMP      AVERAGE AMBIENT AIR TEMPERATURE FOR NAVG HOURS. ALSO
           TEMPERATURE FOR THIS HOUR(KELVIN)
    THETA   -   349=    372WR   393=    398
THETA     RESULTANT WIND DIRECTION FOR NHOURS(DEGREES).ALSO WIND
           DIRECTION FOR THIS HOUR
    TITLE   -      8DI    110A    45WR    132WR   147WR   493WR
TITLE(2) TITLE(1)=' SO2  ', TITLE(2)=' PART '
    TLOS    -      5CO    52=
TLOS      PARTIAL COMPUTATION RELATED TO POLLUTANT LOSS.
    TOM     -      90=    91      91
TOM       DUMMY VARIABLE TO FIND LOWEST SOURCE HEIGHT.
    TRAD    -   332=    338     335     398=    399     400
TRAD      ANGLE OF THE WIND THIS HOUR IN RADIANS.
    TS      -      95=    96      99      99
TS        STACK TEMPERATURE(KELVIN)
    U       -      5CO   312=    342=    342     350=    350     357     372WR   394=
U         AVERAGE WIND SPEED. ALSO WIND SPEED FOR THIS HOUR(METERS/SEC)
    UPL     -      8CO
UPL       WIND SPEED AT STACK HEIGHT(METERS/SECOND)
    UR      -   337=    339
UR        EAST COMPONENT OF THE WIND FOR THIS HOUR.(METERS/SEC)
    URES    -   336=    337     338     342     352=    353     372WR
URES      RESULTANT WIND SPEED(METERS/SEC)
    VR      -   338=    340
VR        NORTH COMPONENT OF THE WIND FOR THIS HOUR.(METERS/SEC)
    X       -      8CO
X         UPWIND DISTANCE FROM RECEPTOR TO SOURCE (KILOMETERS).
    Y       -      8CO
Y         CROSSWIND DISTANCE FROM RECEPTOR TO SOURCE(KILOMETERS).
    Z       -      8CO
Z         RECEPTOR HEIGHT(METERS)
    ZR      -      3CO   216=    238RD   252WR   476WR
ZR(180)  RECEPTOR HEIGHT ABOVE LOCAL GROUND LEVEL.
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02388*        1        BLOCK DATA                                                        DAT00010
02389*             C** *COEFFICIENTS GENERATED WITH RURAL SIGMAS USING PGYZ              DAT00020
02390*             C** *RELATIVE CONC. NORMALIZED FOR WIND SPEED FROM PT SOURCE, CHI*U/Q, = DAT00030
02391*             C** *     PXUCOF(KST,IH)*H**PXUEXP(KST,IH)                            DAT00040
02392*             C** *   IH=1 FOR H LESS THAN 20 METERS.                               DAT00050
02393*             C** *   IH=2 FOR H FROM 20 TO 30 METERS.                              DAT00060
02394*             C** *   IH=3 FOR H FROM 30 TO 50 METERS.                              DAT00070
02395*             C** *   IH=4 FOR H FROM 50 TO 70 METERS.                              DAT00080
02396*             C** *   IH=5 FOR H FROM 70 TO 100 METERS.                             DAT00090
02397*             C** *   IH=6 FOR H FROM 100 TO 200 METERS.                            DAT00100
02398*             C** *   IH=7 FOR H FROM 200 TO 300 METERS.                            DAT00110
02399*             C** *   IH=8 FOR H FROM 300 TO 500 METERS.                            DAT00120
02400*             C** *   IH=9 FOR H GREATER THAN 500 METERS.                           DAT00130
02401*        2        COMMON /EXPOS/ PXUCOF(6,9),PXUEXP(6,9),HC1(10)                    DAT00140
02402*        3        DATA PXUCOF /.10401E+00,.12133E+00,.14273E+00,.15351E+00,.18855E+00AT00150
02403*                10,.18668E+00,.77533E-01,.11728E+00,.14120E+00,.18779E+00,.20458E+00AT00160
02404*                20,.30326E+00,.67228E-01,.10013E+00,.13963E+00,.19162E+00,.30908E+00AT00170
02405*                30,.76271E+00,.40484E-01,.75308E-01,.13784E+00,.58357E+00,.72550E+00AT00180
02406*                40,.22936E+01,.28539E-01,.66936E-01,.13615E+00,.52790E+00,.12908E+00AT00190
02407*                51,.56983E+01,.14792E-01,.65799E-01,.13315E+00,.78832E+00,.28818E+00AT00200
02408*                61,.40990E+03,.12403E-01,.68321E-01,.12927E+00,.10826E+01,.77020E+00AT00210
02409*                72,.23011E+05,.12340E-01,.62874E-01,.12586E+00,.15580E+01,.68810E+00AT00220
02410*                83,.86522E+06,.12245E-01,.60615E-01,.11952E+00,.22917E+01,.42842E+00AT00230
02411*                9?,.00000E+00/                                                     DAT00240
02412*        4        DATA PXUEXP /-.19460E+01,-.19778E+01,-.20886E+01,-.20782E+01,-.2180AT00250
02413*                122E+01,-.22176E+01,-.18479E+01,-.19661E+01,-.20050E+01,-.21317E+010AT00260
02414*                2,-.22098E+01,-.24209E+01,-.18560E+01,-.19196E+01,-.20017E+01,-.2140AT00270
02415*                362E+01,-.23091E+01,-.26556E+01,-.16763E+01,-.18468E+01,-.19988E+010AT00280
02416*                4,-.24128E+01,-.25578E+01,-.29371E+01,-.15800E+01,-.18191E+01,-.1990AT00290
02417*                555E+01,-.28059E+01,-.26988E+01,-.31511E+01,-.14857E+01,-.19153E+010AT00300
02418*                6,-.19907E+01,-.28917E+01,-.28678E+01,-.40795E+01,-.14181E+01,-.1810AT00310
02419*                711E+01,-.19851E+01,-.25518E+01,-.34879E+01,-.48398E+01,-.14172E+010AT00320
02420*                8,-.18071E+01,-.19799E+01,-.26152E+01,-.38719E+01,-.53670E+01,-.1410AT00330
02421*                960E+01,-.18012E+01,-.19721E+01,-.26784E+01,-.37958E+01,-.17020E+020AT00340
02422*                A/                                                                 DAT00350
02423*        5        DATA HC1 /10.,20.,30.,50.,70.,100.,200.,300.,500.,1000./          DAT00360
02424*             C                                                                     DAT00370
02425*        6        END                                                               DAT00380
       SYMBOL      = = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = = =

       EXPOS   -     2C0
       HC1     -     2C0      5DA
       PXUCOF  -     2C0      3DA
       PXUEXP  -     2C0      4DA
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FUNCTION ANGARC (DELM,DELN)

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02426*        1            FUNCTION ANGARC (DELM,DELN)
02427*               C        DETERMINES APPROPRIATE ANGLE OF TAN(ANG) = DELM/DELN           ARC00010
02428*               C        WHICH IS REQUIRED FOR CALCULATION OF RESULTANT WIND DIRECTION. ARC00020
02429*               C        DELM IS THE AVERAGE WIND COMPONENT IN THE EAST DIRECTION.      ARC00030
02430*               C        DELN IS THE AVERAGE WIND COMPONENT IN THE NORTH DIRECTION.     ARC00040
02431*               C        NO COMMON REQUIREMENT, NO ARRAYS, USES LIBRARY FUNCTION ATAN   ARC00050
02432*        2            IF (DELN) 10,80,80                                                ARC00060
02433*        3      10    IF (DELM) 20,30,20                                                ARC00070
02434*        4      20    ANGARC=57.29578*ATAN(DELM/DELN)+180.                              ARC00080
02435*        5            RETURN                                                            ARC00090
02436*        6      30    ANGARC=180.                                                       ARC00100
02437*        7            RETURN                                                            ARC00110
02438*        8      40    IF (DELM) 50,60,70                                                ARC00120
02439*        9      50    ANGARC=270.                                                       ARC00130
02440*       10            RETURN                                                            ARC00140
02441*       11      60    ANGARC=0.                                                         ARC00150
02442*               C     ANGARC=0. INDICATES INDETERMINATE ANGLE                           ARC00160
02443*       12            RETURN                                                            ARC00170
02444*       13      70    ANGARC=090.                                                       ARC00180
02445*       14            RETURN                                                            ARC00190
02446*       15      80    IF (DELM) 90,100,110                                              ARC00200
02447*       16      90    ANGARC=57.29578*ATAN(DELM/DELN)+360.                              ARC00210
02448*       17            RETURN                                                            ARC00220
02449*       18     100    ANGARC=360.                                                       ARC00230
02450*       19            RETURN                                                            ARC00240
02451*       20     110    ANGARC=57.29578*ATAN(DELM/DELN)                                   ARC00250
02452*       21            RETURN                                                            ARC00260
02453*               C                                                                       ARC00270
02454*       22            END                                                               ARC00280
                                                                                             ARC00290

SYMBOL     = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = =

10       -     2       3*
20       -     3       3      4*
30       -     3       6*
40       -     2       8*
50       -     8       9*
60       -     8      11*
70       -     8      13*
80       -     2      15*
90       -    15      16*
100      -    15      18*
110      -    15      20*
ANGARC   -    LEY     4=      6=      9=      11=     13=     16=     18=     20=
ATAN     -     4      16      20
DELM     -    IAG     3       4       8       15      16      20
DELN     -    IAG     2       4       16      20
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SUBROUTINE PTR

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02032*      1          SUBROUTINE PTR                                                    PTR00010
02033*            C      THE PURPOSE OF THIS ROUTINE IS TO CALCULATE CONCENTRATIONS FROM   PTR00020
02034*            C      POINT SOURCES.                                                    PTR00030
02035*            C                                                                        PTR00040
02036*            C->->->->SECTION PTR.A - COMMON AND DIMENSION.                           PTR00050
02037*            C                                                                        PTR00060
02038*      2          COMMON /MPOR/ IOPT(25)                                             PTR00070
02039*      3          COMMON /MPO/ NRECEP,NAVG,NBLH,NPT,IDATE(3),RREC(180),SREC(180),ZRPTR00080
02040*                1(180),ELR(180),PHCHI(180),PHSIGS(180,26),HSAV(250),DSAV(250),PCHI(PTR00090
02041*                2180),PSIGS(180,25),IPOL                                           PTR00100
02042*      4          COMMON /MPR/ UPL,Z,H,HL,X,Y,KST,DELH,SY,SZ,RC                      PTR00110
02043*      5          COMMON /MP/ SOURCE(9,250),CONTWO,PSAV(250),IPSIGS(250),U,TEMP,SINTPTR00120
02044*                1,COST,PL(6),ELP(250),ELHN,HANE,TLOS,CELM,CTER                     PTR00130
02045*      6          DIMENSION UPH(250), HPR(250), EP(250), DH(250), PARTC(250)          PTR00140
02046*            C                                                                        PTR00150
02047*            C->->->->SECTION PTR.B - INITIALIZE AND START RECEPTOR LOOP.             PTR00160
02048*            C                                                                        PTR00170
02049*            C         ZERO EFFECTIVE STACK HEIGHT FOR EACH SOURCE                    PTR00180
02050*            C                                                                        PTR00190
02051*            C           NPT - THE NUMBER OF POINT SOURCES                            PTR00200
02052*      7          DO 10 J=1,NPT                                                     PTR00210
02053*            C         HSAV WILL BE USED TO STORE THE SOURCE PLUME HEIGHTS.           PTR00220
02054*      8     10   HSAV(J)=0.0                                                       PTR00230
02055*            C         LOOP ON RECEPTORS                                              PTR00240
02056*            C           NRECEP - THE NUMBER OF RECEPTORS                             PTR00250
02057*      9          DO 180 K=1,NRECEP                                                 PTR00260
02058*            C         IF IOPT(1)=1, TERRAIN ADJUSTMENTS ARE MADE.                    PTR00270
02059*     10          IF (IOPT(1).EQ.0) GO TO 20                                        PTR00280
02060*            C           ELR - RECEPTOR GROUND LEVEL ELEVATION                        PTR00290
02061*     11          ER=ELR(K)                                                         PTR00300
02062*            C           ELHN - LOWEST SOURCE STACK-TOP ELEVATION?                    PTR00310
02063*     12          IF (ER.LE.ELHN) GO TO 20                                          PTR00320
02064*     13          PCHI(K)=99999.E+26                                                PTR00330
02065*     14          PHCHI(K)=99999.E+26                                               PTR00340
02066*     15          GO TO 180                                                         PTR00350
02067*     16     20   CONTINUE                                                          PTR00360
02068*            C           ZR - RECEPOR HEIGHT ABOVE GROUND                             PTR00370
02069*     17          Z=ZR(K)                                                           PTR00380
02070*            C                                                                        PTR00390
02071*            C->->->->SECTION PTR.C - START SOURCES LOOP, CALCULATE                   PTR00400
02072*            C                           UPWIND AND CROSSWIND DISTANCES.              PTR00410
02073*            C                                                                        PTR00420
02074*     18          DO 170 J=1,NPT                                                    PTR00430
02075*     19          PARTC(J)=0.0                                                      PTR00440
02076*            C           RO - EAST COORDINATE OF THE SOURCE                           PTR00450
02077*     20          RO=SOURCE(1,J)                                                    PTR00460
02078*            C           SO - NORTH COORDINATE OF THE SOURCE                          PTR00470
02079*     21          SO=SOURCE(2,J)                                                    PTR00480
02080*            C           ELP - SOURCE GROUND LEVEL ELEVATION                          PTR00490
02081*     22          EP=ELP(J)                                                         PTR00500
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02082*                C       DETERMINE UPWIND DISTANCE                                   PTR00510
02083*                C       XDUM,YDUM IN USER UNITS. X,Y IN KM.                         PTR00520
02084*                C         RREC - EAST COORDINATE OF THE RECEPTOR                    PTR00530
02085*          23          XDUM=RO-RREC(K)                                               PTR00540
02086*                C         SREC - NORTH COORDINATE OF THE RECEPTOR                   PTR00550
02087*          24          YDUM=SO-SREC(K)                                               PTR00560
02088*                C       SINT AND COST ARE THE SIN AND COS OF THE WIND DIRECTION     PTR00570
02089*                C       CONTWO - MULTIPLIER CONSTANT TO CONVERT USER UNITS TO KM    PTR00580
02090*          25          X=(YDUM*COST+XDUM*SINT)*CONTWO                                PTR00590
02091*                C        X IS THE UPWIND DISTANCE  OF THE SOURCE FROM THE RECEPTOR.  PTR00600
02092*                C       IF X IS NEGATIVE, INDICATING THAT THE SOURCE IS DOWNWIND OF PTR00610
02093*                C       THE RECEPTOR, THE CALCULATION IS TERMINATED ASSUMING NO     PTR00620
02094*                C       CONTRIBUTION FROM THAT SOURCE.                              PTR00630
02095*          26          IF (X.LE.0.0) GO TO 170                                       PTR00640
02096*                C                                                                   PTR00650
02097*                C       DETERMINE CROSSWIND DISTANCE                                PTR00660
02098*                C                                                                   PTR00670
02099*          27          Y=(YDUM*SINT-XDUM*COST)*CONTWO                                PTR00680
02100*          28          H=HSAV(J)                                                     PTR00690
02101*                C       SKIP PLUME RISE CALCULATION IF EFFECTIVE HT. HAS ALREADY BEEN PTR00700
02102*                C         CALCULATED FOR THIS SOURCE                                PTR00710
02103*          29          IF (H.EQ.0.0) GO TO 30                                        PTR00720
02104*          30          DELH=DH(J)                                                    PTR00730
02105*                C                                                                   PTR00740
02106*                C->->->->SECTION PTR.D - EXTRAPOLATE WIND SPEED TO STACK TOP        PTR00750
02107*                C                         CALCULATE PLUME RISE.                     PTR00760
02108*                C                                                                   PTR00770
02109*          31          GO TO 110                                                     PTR00780
02110*                C        MODIFY WIND SPEED BY POWER LAW PROFILE IN ORDER TO TAKE INTO PTR00790
02111*                C       ACCOUNT THE INCREASE OF WIND SPEED WITH HEIGHT.             PTR00800
02112*                C       ASSUME WIND MEASUREMENTS ARE REPRESENTATIVE FOR HEIGHT = HANE. PTR00810
02113*                C        THT IS THE PHYSICAL STACK HEIGHT                           PTR00820
02114*          32    30    THT=SOURCE(5,J)                                               PTR00830
02115*                C       POINT SOURCE HEIGHT NOT ALLOWED TO BE LESS THAN 1 METER.    PTR00840
02116*          33          IF (THT.LT.1.) THT=1.                                         PTR00850
02117*                C         U - WIND SPEED AT HEIGHT 'HANE'                           PTR00860
02118*                C         PL - POWER FOR THE WIND PROFILE                           PTR00870
02119*                C         UPL - WIND AT THE PHYSICAL STACK HEIGHT                   PTR00880
02120*          34          UPL=U*(THT/HANE)**PL(KST)                                     PTR00890
02121*                C       WIND SPEED NOT ALLOWED TO BE LESS THAN 1 METER/SEC.         PTR00900
02122*          35          IF (UPL.LT.1.) UPL=1.                                         PTR00910
02123*                C       STORE THE STACK TOP WIND FOR THE JTH SOURCE FOR THIS HOUR   PTR00920
02124*          36          UPH(J)=UPL                                                    PTR00930
02125*          37          VS=SOURCE(8,J)                                                PTR00940
02126*          38          BUOY=SOURCE(9,J)                                              PTR00950
02127*          39          TS=SOURCE(6,J)                                                PTR00960
02128*                C       TEMP - THE AMBIENT AIR TEMPERATURE FOR THIS HOUR            PTR00970
02129*          40          DELT=TS-TEMP                                                  PTR00980
02130*          41          F=BUOY*DELT/TS                                                PTR00990
02131*                C        IOPT(6) HOURLY EMISSION INPUT FROM TAPE/DISK?  0=NO, 1=YES. PTR01000
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02132*      42        IF (IOPT(6).EQ.0) GO TO 40                                   PTR01010
02133*           C       MODIFY EXIT VELOCITY AND BUOYANCY BY RATIO OF HOURLY EMISSIONS PTR01020
02134*           C       TO AVERAGE EMISSIONS                                      PTR01030
02135*      43        SCALE=SOURCE(IP01,J)/PSAV(J)                                 PTR01040
02136*      44        VS=VS*SCALE                                                  PTR01050
02137*      45        F=F*SCALE                                                    PTR01060
02138*      46   40   D=SOURCE(7,J)                                                PTR01070
02139*           C       CALCULATE  H PRIME WHICH TAKES INTO ACCOUNT STACK DOWNWASH PTR01080
02140*           C       BRIGGS(1973) PAGE 4                                       PTR01090
02141*      47        HPRM=THT                                                     PTR01100
02142*           C       IF IOPT(2)=1, THEN NO STACK DOWNWASH COMPUTATION          PTR01110
02143*      48        IF (IOPT(2).EQ.1) GO TO 50                                   PTR01120
02144*      49        DUM=VS/UPL                                                   PTR01130
02145*      50        IF (DUM.LT.1.5) HPRM=THT+2.*D*(DUM-1.5)                      PTR01140
02146*           C       'HPRM' IS BRIGGS' H-PRIME                                 PTR01150
02147*      51        IF (HPRM.LT.0.) HPRM=0.                                      PTR01160
02148*      52   50   CONTINUE                                                     PTR01170
02149*           C                                                                 PTR01180
02150*           C       CALCULATE PLUME RISE AND ADD H PRIME TO OBTAIN EFFECTIVE  PTR01190
02151*           C       STACK HEIGHT.                                             PTR01200
02152*           C                                                                 PTR01210
02153*           C       PLUME RISE CALCULATION                                    PTR01220
02154*      53        IF (KST.GT.4) GO TO 70                                       PTR01230
02155*           C       PLUME RISE FOR UNSTABLE CONDITIONS                        PTR01240
02156*      54        IF (TS.LT.TEMP) GO TO 80                                     PTR01250
02157*      55        IF (F.GE.55.) GO TO 60                                       PTR01260
02158*           C       DETERMINE DELTA-T FOR BUOYANCY-MOMENTUM CROSSOVER(F<55.)  PTR01270
02159*           C       FOUND BY EQUATING BRIGGS(1969) EQ 5.2, P.59 WITH COMBINATION OFPTR01280
02160*           C       BRIGGS(1971) EQUATIONS 6 AND 7, PAGE 1031 FOR F<55.       PTR01290
02161*      56        DTMB=0.0297*TS*VS**0.33333/D**0.66667                        PTR01300
02162*      57        IF (DELT.LT.DTMB) GO TO 80                                   PTR01310
02163*           C       DISTANCE OF FINAL BUOYANT RISE(0.049 IS 14*3.5/1000)      PTR01320
02164*           C       BRIGGS(1971) EQN. 7,F<55, AND DIST TO FINAL RISE IS 3.5 XSTAR  PTR01330
02165*           C       DISTF IN KILOMETERS                                       PTR01340
02166*      58        DISTF=0.049*F**0.625                                         PTR01350
02167*           C       COMBINATION OF BRIGGS(1971) EQNS. 6 AND 7, PAGE 1031 FOR F<55. PTR01360
02168*      59        DELH=21.425*F**0.75/UPL                                      PTR01370
02169*      60        GO TO 100                                                    PTR01380
02170*           C       DETERMINE DELTA-T FOR BUOYANCY-MOMENTUM CROSSOVER(F>55.)  PTR01390
02171*           C       FOUND BY EQUATING BRIGGS(1969) EQ 5.2, P.59 WITH COMBINATION OFPTR01400
02172*           C        BRIGGS(1971) EQUATIONS 6 AND 7, PAGE 1031 FOR F>55.      PTR01410
02173*      61   60   DTMB=0.00575*TS*VS**0.66667/D**0.33333                       PTR01420
02174*      62        IF (DELT.LT.DTMB) GO TO 80                                   PTR01430
02175*           C       DISTANCE OF FINAL BUOYANT RISE (0.119 IS 34*3.5/1000)     PTR01440
02176*           C       BRIGGS(1971) EQN. 7, F>55, AND DIST TO FINAL RISE IS 3.5 XSTAR PTR01450
02177*           C       DISTF IN KILOMETERS                                       PTR01460
02178*      63        DISTF=0.119*F**0.4                                           PTR01470
02179*           C       COMBINATION OF BRIGGS(1971) EQNS. 6 AND 7, PAGE 1031 FOR F>55. PTR01480
02180*      64        DELH=38.71*F**0.6/UPL                                        PTR01490
02181*      65        GO TO 100                                                    PTR01500
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SUBROUTINE PTR

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02182*             C        PLUME RISE FOR STABLE CONDITIONS.                                  PTR01510
02183*      66     70   DTHDZ=0.02                                                           PTR01520
02184*      67          IF (KST.GT.5) DTHDZ=0.035                                            PTR01530
02185*      68          S=9.80616*DTHDZ/TEMP                                                 PTR01540
02186*      69          IF (TS.LT.TEMP) GO TO 90                                             PTR01550
02187*             C        DETERMINE DELTA-T FOR BUOYANCY-MOMENTUM CROSSOVER(STABLE)          PTR01560
02188*             C        FOUND BY EQUATING BRIGGS(1975) EQ 59, P. 96 FOR STABLE BUOYANCY PTR01570
02189*             C        RISE WITH BRIGGS(1969) EQ 4.28, P. 59 FOR STABLE MOMENTUM RISE.PTR01580
02190*      70          DTMB=0.019582*TEMP*VS*SQRT(S)                                        PTR01590
02191*      71          IF (DELT.LT.DTMB) GO TO 90                                           PTR01600
02192*             C        STABLE BUOYANT RISE FOR WIND CONDITIONS.(WIND NOT ALLOWED LOW    PTR01610
02193*             C        ENOUGH TO REQUIRE STABLE RISE IN CALM CONDITIONS.)                 PTR01620
02194*             C        BRIGGS(1975) EQ 59, PAGE 96.                                       PTR01630
02195*      72          DELH=2.6*(F/(UPL*S))**0.333333                                       PTR01640
02196*             C        COMBINATION OF BRIGGS(1975) EQ 48 AND EQ 59. NOTE DISTF IN KM.    PTR01650
02197*      73          DISTF=0.0020715*UPL/SQRT(S)                                          PTR01660
02198*      74          GO TO 100                                                            PTR01670
02199*             C        UNSTABLE-NEUTRAL MOMENTUM RISE                                     PTR01680
02200*             C        BRIGGS(1969) EQN. 5.2, PAGE 59 NOTE: MOST ACCURATE WHEN VS/U>4;PTR01690
02201*             C        TENDS TO OVERESTIMATE RISE WHEN VS/U<4 (SEE BRIGGS(1975) P. 78,PTR01700
02202*             C         FIGURE 4.)                                                        PTR01710
02203*      75     80   DELH=3.*VS*D/UPL                                                     PTR01720
02204*      76          DISTF=0.                                                             PTR01730
02205*      77          GO TO 100                                                            PTR01740
02206*             C        STABLE MOMENTUM RISE                                               PTR01750
02207*      78     90   DHA=3.*VS*D/UPL                                                      PTR01760
02208*             C        BRIGGS(1969) EQUATION 4.28, PAGE 59                                PTR01770
02209*      79          DELH=1.5*(VS*VS*D*D*TEMP/(4.*TS*UPL))**0.333333/S**0.166667          PTR01780
02210*      80          IF (DHA.LT.DELH) DELH=DHA                                            PTR01790
02211*      81          DISTF=0.                                                             PTR01800
02212*             C        STORE OFF PLUME HEIGHT(ETC.) FOR THIS SOURCE FOR USE WITH          PTR01810
02213*             C        OTHER RECEPTORS.                                                   PTR01820
02214*      82    100   H=HPRM+DELH                                                          PTR01830
02215*      83          HSAV(J)=H                                                            PTR01840
02216*      84          DH(J)=DELH                                                           PTR01850
02217*      85          DSAV(J)=DISTF                                                        PTR01860
02218*      86          UPH(J)=UPL                                                           PTR01870
02219*      87          HPR(J)=HPRM                                                          PTR01880
02220*      88          FP(J)=F                                                              PTR01890
02221*             C        IF SOURCE-RECEPTOR DISTANCE IS GREATER OR EQUAL TO DISTANCE TO PTR01900
02222*             C        FINAL RISE, SKIP PLUME RISE CALCULATION AND USE FINAL RISE.        PTR01910
02223*      89    110   IF (X.GE.DSAV(J)) GO TO 120                                          PTR01920
02224*      90          IF (IOPT(4).EQ.0.AND.IOPT(3).EQ.1) GO TO 120                         PTR01930
02225*             C        CALCULATE GRADUAL PLUME RISE IF (1) THE USER SPECIFIES SO,         PTR01940
02226*             C        OR (2) USER EMPLOYS CALCULATION OF INITIAL DISPERSION.....         PTR01950
02227*             C        IN THIS CASE, USE OF FINAL EFFECTIVE HEIGHT IN THE CALCULATION PTR01960
02228*             C        OF DISPERSION COEFFICENTS COULD LEAD TO MISLEADING VALUES SINCEPTR01970
02229*             C          SIGMA-Y,-Z =  DELTA-H/3.5                                        PTR01980
02230*      91          DELH=160.*FP(J)**0.333333*X**0.666667/UPH(J)                         PTR01990
02231*             C        PLUME RISE FOR DISTANCE X(160 IS 1.6*1000**.67 BECAUSE X IN KM)PTR02000
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```
      IF (DELH.GT.DH(J)) DELH=DH(J)                                     PTR02010
      IF (IOPT(3).EQ.1) GO TO 120                                       PTR02020
C        IF SPECIFYING CALCULATION OF INITIAL DISPERSION BUT ARE NOT    PTR02030
C        SPECIFYING CALCULATION OF GRADUAL PLUME RISE, THEN DO NOT      PTR02040
C        ADD THE NEW GRADUAL DELTA-H TO THE EFFECTIVE HEIGHT. OTHERWISE,PTR02050
C        CHECK THE GRADUAL RISE PLUME HEIGHT WITH FINAL EFFECTIVE HEIGHTPTR02060
C        AND SET THE PLUME HEIGHT TO THE SMALLER OF THE TWO VALUES.     PTR02070
      H=HPR(J)+DELH                                                     PTR02080
C        ADD PLUME RISE TO STACK HEIGHT FOR TOTAL EFFECTIVE STACK HT.   PTR02090
C        END PLUME RISE CALCULATION                                     PTR02100
  120 UPL=UPH(J)                                                        PTR02110
C                                                                       PTR02120
C->->->->SECTION PTR.E - CALCULATE THE CONTRIBUTION OF                  PTR02130
C                             ONE SOURCE TO ONE RECEPTOR.               PTR02140
C                                                                       PTR02150
      IF (H.LT.HL) GO TO 130                                            PTR02160
      PROD=0.                                                           PTR02170
      GO TO 150                                                         PTR02180
C        IF IOPT(1) = 1, TERRAIN ADJUSTMENTS ARE MADE                   PTR02190
  130 IF (IOPT(1).EQ.0) GO TO 140                                       PTR02200
      DUM=ER-EP                                                         PTR02250
      H=H+CELM*(CTER*DUM-DUM)                                           PTR02260
C         RCP RETURNS THE DISPERSION PARAMETERS, SY AND SZ (METERS)     PTR02270
C        AND THE RELATIVE CONCENTRATION VALUES CHI/Q (SEC/M**3)         PTR02280
  140 CALL RCP                                                          PTR02290
C        CALCULATE TRAVEL TIME IN KM-SEC/M TO INCLUTE DECAY RATE OF     PTR02300
C        POLLUTANT.                                                     PTR02310
      TT=X/UPL                                                          PTR02320
C        TLOS IN METERS/KM-SEC, SO TT*TLOS IS DIMENSIONLESS             PTR02330
C        INCLUDE THE POLLUTANT LOSS                                     PTR02340
      PROD=RC*SOURCE(IPOL,J)/EXP(TT*TLOS)                               PTR02350
C        IF HAFL IS ZERO, TLOS WILL START AS ZERO AND                   PTR02360
C        RESULT IN NO COMPUTATIION OF POLLUTANT LOSS.                   PTR02370
C        INCREMENT CONCENTRATION AT K-TH RECEPTOR(G/M**3)               PTR02380
C          PCHI - SUM FOR THE AVERAGING TIME AT RECEPTOR K              PTR02390
  150 PCHI(K)=PCHI(K)+PROD                                              PTR02400
C          PHCHI - CONCENTRATION FOR THIS HOUR AT RECEPTOR K            PTR02410
      PHCHI(K)=PHCHI(K)+PROD                                            PTR02420
      KSIG=IPSIGS(J)                                                    PTR02430
      IF (KSIG.EQ.0) GO TO 160                                          PTR02440
C        STORE CONCENTRATIONS FROM SIGNIFICANT SOURCES. (G/M**3)        PTR02450
      PSIGS(K,KSIG)=PSIGS(K,KSIG)+PROD                                  PTR02460
      PHSIGS(K,KSIG)=PHSIGS(K,KSIG)+PROD                                PTR02470
      PSIGS(K,26)=PSIGS(K,26)+PROD                                      PTR02480
      PHSIGS(K,26)=PHSIGS(K,26)+PROD                                    PTR02490
  160 PARTC(J)=PROD                                                     PTR02500
C                                                                       PTR02510
C->->->->SECTION PTR.F - END SOURCE AND RECEPTOR LOOPS.                 PTR02520
C                                                                       PTR02530
  170 CONTINUE                                                          PTR02540
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                 C        END OF LOOP FOR SOURCES                                      PTR02550
                 C        WRITE PARTIAL CONCENTRATIONS ON DISK(G/M**3)  IF IOPT(21) = 1. PTR02560
      115             IF (IOPT(21).EQ.0) GO TO 180                                     PTR02570
                 C        USER PLEASE NOTE: PARTIAL CONC. IN G/M**3, NOT MICROGRAM/M**3 PTR02580
      116             WRITE (10) IDATE,LH,K,(PARTC(J),J=1,NPT)                         PTR02590
      117        180  CONTINUE                                                         PTR02600
                 C        END OF LOOP FOR RECEPTORS                                    PTR02610
      118             RETURN                                                           PTR02620
                 C                                                                     PTR02630
                 C**   SECTIONS OF SUBROUTINE PTR.                                     PTR02640
                 C          SECTION PTR.A -  COMMON AND DIMENSION.                     PTR02650
                 C          SECTION PTR.B -  INITIALIZE AND START RECEPTOR LOOP.       PTR02660
                 C          SECTION PTR.C -  START SOURCES LOOP; CALCULATE UPWIND AND  PTR02670
                 C                             CROSSWIND DISTANCES.                    PTR02680
                 C          SECTION PTR.D -  EXTRAPOLATE WIND SPEED TO STACK TOP;      PTR02690
                 C                             CALCULATE PLUME RISE.                   PTR02700
                 C          SECTION PTR.E -  CALCULATE CONTRIBUTION FROM A SOURCE TO ONE PTR02710
                 C                             RECEPTOR.                               PTR02720
                 C          SECTION PTR.F -  END SOURCE AND RECEPTOR LOOPS.            PTR02730
                 C                                                                     PTR02740
      119             END                                                              PTR02750
```

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                              SUBROUTINE PTR

SYMBOL      = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = = =

10       -     7      8*
20       -    10     12     16*
30       -    29     32*
40       -    42     46*
50       -    48     52*
60       -    55     61*
70       -    53     66*
80       -    54     57     62     75*
90       -    69     71     78*
100      -    60     65     74     77     82*
110      -    31     89*
120      -    89     90     93     95*
130      -    96     99*
140      -    99    102*
150      -    98    105*
160      -   108    113*
170      -    18     26    118*
180      -     9     15    115    117*
BUDY     -    38=    41
CFLM     -    5C0   101
CONTWO   -    5C0    25     27
COST     -    5C0    25     27
CTER     -    5C0   101
D        -    46=    50     56     61     75     78     79     79
DELH     -    4C0    30=    59=    64=    72=    75=    79=    80     80=    82
              84     91=    92     92=    98
DELT     -    40=    41     57     62     71
DH       -    6DI    30     84=    92     92
DHA      -    78=    80     80
DISTF    -    58=    63=    73=    76=    81=    85
DSAV     -    3C0    85=    89
DTHDZ    -    66=    67=    68
DTMB     -    56=    57     61=    62     70=    71
DUM      -    49=    50     50    100=   101    101
ELHN     -    5C0    12
ELP      -    5C0    22
ELR      -    3C0    11
EP       -    22=   100
ER       -    11=    12    100
EXP      -   104
F        -    41=    45=    45     55     58     59     63     68     72     88
FP       -    6DI    88=    91
H        -    4C0    28=    29     82=    83     94=    96    101=   101
HANF     -    5C0    74
HL       -    4C0    96
HPR      -    6DI    87=    94
HPRM     -    87=    50=    51     51=    82     87
HSAV     -    3C0     8=    28     83=
                         SUBROUTINE PTR

IDATE   -   3C0   116WR
IOPT    -   2C0   10     42     48     90     90     93     99     115
IPOL    -   3C0   43     104
IPSIGS  -   5C0   107
J       -   7     8      18     19     20     21     22     28     30     32
            36    37     38     39     42     43     46     83     84     85
            86    87     88     89     91     91     92     92     94     95
            104   107    113    116WR  116WR
K       -   9     11     13     14     17     23     24     105    105    106
            106   109    109    110    110    111    111    112    112    116WR
KSIG    -   107=  108    109    109    110    110
KST     -   4C0   34     53     67
LH      -   3C0   116WR
MP      -   5C0
MPO     -   3C0
MPOR    -   2C0
MPR     -   4C0
NAVG    -   3C0
NB      -   3C0
NPT     -   3C0   7      18     116WR
NRECEP  -   3C0   9
PARTC   -   6DI   19=    113=   116WR
PCHI    -   3C0   13=    105=   105
PHCHI   -   3C0   14=    106=   106
PHSIGS  -   3C0   110=   110    112=   112
PL      -   5C0   34
PROD    -   97=   104=   105    106    109    110    111    112    113
PSAV    -   5C0   43
PSIGS   -   3C0   109=   109    111=   111
PTR     -   1EY
RC      -   4C0   104
RCP     -   112
RO      -   20=   23
RREC    -   3C0   23
S       -   68=   70     72     73     79
SCALE   -   43=   44     45
SINT    -   5C0   25     27
SOURCE  -   5C0   20     21     32     37     38     39     43     46     104
SQ      -   21=   24
SQRT    -   70    73
SREC    -   3C0   24
SY      -   4C0
SZ      -   4C0
TEMP    -   5C0   40     54     68     69     70     79
THT     -   32=   33     33=    34     47     50
TLOC    -   5C0   104
TS      -   39=   40     41     54     56     61     69     79
TT      -   103=  104
U       -   5C0   34
UPH     -   6DI   36=    86=    91     95
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                    SUBROUTINE PTR

UPL      -     400    34=    35     35=    36     49     59     68     72     73
               75     78     79     86     95=    103
VS       -     37=    44=    44     49     56     61     70     75     78     79
               79
X        -     400    25=    26     89     91     103
XOUM     -     23=    25     27
Y        -     400    27=
YOUM     -     24=    25     27
Z        -     400    17=
ZR       -     300    17
-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      SUBROUTINE RCP                                                    RCP00010
C                                                                       RCP00020
C->->->->SECTION RCP.A - COMMON.                                        RCP00030
      COMMON /MPOR/ IOPT(25)                                            RCP00040
      COMMON /MPR/ UPL,Z,H,HL,X,Y,KST,DELH,SY,SZ,RC                     RCP00050
C                                                                       RCP00060
C***  MODIFICATIONS:                                                    RCP00070
C       11/27/79 BY K. W. BALDRIDGE, C.S.C., CONVERTED CODE FROM FIELDATARCP00080
C                 TO ASCII FORTRAN AND MADE CODE MORE STANDARD          RCP00090
C                                                                       RCP00100
C->->->->SECTION RCP.B - EXPLANATIONS AND COMPUTATIONS                  RCP00110
C                          COMMON TO ALL CONDITIONS.                    RCP00120
C                                                                       RCP00130
C  RCP DETERMINES RELATIVE CONCENTRATIONS, CHI/Q, FROM POINT SOURCES.   RCP00140
C        IT CALLS UPON  PGYZ TO OBTAIN STANDARD DEVIATIONS.             RCP00150
C       THE INPUT VARIABLES ARE....                                     RCP00160
C        UPL   WIND SPEED (M/SEC)                                       RCP00170
C        Z     RECEPTOR HEIGHT (M)                                      RCP00180
C        H     EFFECTIVE STACK HEIGHT (M)                               RCP00190
C        HL    MIXING HEIGHT- TOP OF NEUTRAL OR UNSTABLE LAYER(M).      RCP00200
C        X     DISTANCE RECEPTOR IS DOWNWIND OF SOURCE (KM)             RCP00210
C        Y     DISTANCE RECEPTOR IS CROSSWIND FROM SOURCE (KM)          RCP00220
C        KST   STABILITY CLASS                                          RCP00230
C        DELH PLUME RISE(METERS)                                        RCP00240
C       THE OUTPUT VARIABLES ARE....                                    RCP00250
C         SY HORIZONTAL DISPERSION PARAMETER                            RCP00260
C         SZ VERTICAL DISPERSION PARAMETER                              RCP00270
C        RC    RELATIVE CONCENTRATION (SEC/M**3) ,CHI/Q                 RCP00280
C       IO IS CONTROL CODE FOR WARNING OUTPUT.                          RCP00290
      IO=6                                                              RCP00300
C       THE FOLLOWING EQUATION IS SOLVED --                             RCP00310
C       RC = (1/(2*PI*UPL*SIGMA Y*SIGMA Z))* (EXP(-0.5*(Y/SIGMA Y)**2))RCP00320
C          (EXP(-0.5*((Z-H)/SIGMA Z)**2) + EXP(-0.5*((Z+H)/SIGMA Z)**2)RCP00330
C            PLUS THE SUM OF THE FOLLOWING 4 TERMS K TIMES (N=1,K) --   RCP00340
C                 FOR NEUTRAL OR UNSTABLE CASES:                        RCP00350
C             TERM 1 - EXP(-0.5*((Z-H-2NL)/SIGMA Z)**2)                 RCP00360
C             TERM 2 - EXP(-0.5*((Z+H-2NL)/SIGMA Z)**2)                 RCP00370
C             TERM 3 - EXP(-0.5*((Z-H+2NL)/SIGMA Z)**2)                 RCP00380
C             TERM 4 - EXP(-0.5*((Z+H+2NL)/SIGMA Z)**2)                 RCP00390
C NOTE THAT MIXING HEIGHT- THE TOP OF THE NEUTRAL OR UNSTABLE LAYER-    RCP00400
C HAS A VALUE ONLY FOR STABILITIES 1-4, THAT IS, MIXING HEIGHT,         RCP00410
C THE HEIGHT OF THE NEUTRAL OR UNSTABLE LAYER, DOES NOT EXIST FOR STABLERCP00420
C LAYERS AT THE GROUND SURFACE- STABILITY 5 OR 6.                       RCP00430
C       THE ABOVE EQUATION IS SIMILAR TO EQUATION (5.8) P 36 IN         RCP00440
C        WORKBOOK OF ATMOSPHERIC DISPERSION ESTIMATES WITH THE ADDITIONRCP00450
C        OF THE EXPONENTIAL INVOLVING Y.                                RCP00460
C      IF STABLE, SKIP CONSIDERATION OF MIXING HEIGHT.                  RCP00470
      IF (KST.GE.5) GO TO 50                                            RCP00480
C       IF THE SOURCE IS ABOVE THE LID, SET RC = 0., AND RETURN.        RCP00490
      IF (H.GT.HL) GO TO 20                                             RCP00500
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SUBROUTINE RCP

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                                                                                    RCP00510
01850*       7          IF (Z-HL) 50,50,40                                          RCP00520
01851*       8    20    IF (Z.LT.HL) GO TO 40                                       RCP00530
01852*       9          WRITE (IO,870)                                              RCP00540
01853*      10    40    RC=0.                                                       RCP00550
01854*      11          RETURN                                                      RCP00560
01855*           C         IF X IS LESS THAN 1 METER, SET RC=0. AND RETURN.  THIS AVOIDS RCP00570
01856*           C          PROBLEMS OF INCORRECT VALUES NEAR THE SOURCE.           RCP00580
01857*      12    50    IF (X.LT.0.001) GO TO 40                                    RCP00590
01858*           C         CALL PGYZ TO OBTAIN VALUES FOR SY AND SZ                 RCP00600
01859*      13          CALL PGYZ                                                   RCP00610
01860*           C          SY = SIGMA Y, THE STANDARD DEVIATION OF CONCENTRATION IN THE RCP00620
01861*           C          Y-DIRECTION (M)                                         RCP00630
01862*           C          SZ = SIGMA Z, THE STANDARD DEVIATION OF CONCENTRATION IN THE RCP00640
01863*           C          Z-DIRECTION (M)                                         RCP00650
01864*           C        IF IOPT(4)=1, CONSIDER BUOYANCY INDUCED DISPERSION OF PLUME DUE RCP00660
01865*           C          TO TURBULENCE DURING BUOYANT RISE.                      RCP00670
01866*      14          IF (IOPT(4).EQ.0) GO TO 70                                  RCP00680
01867*      15          DUM=DELH/3.5                                                RCP00690
01868*      16          DUM=DUM*DUM                                                 RCP00700
01869*      17          SY=SQRT(SY*SY+DUM)                                          RCP00710
01870*      18          SZ=SQRT(SZ*SZ+DUM)                                          RCP00720
01871*      19    70    C1=1.                                                       RCP00730
01872*      20          IF (Y.EQ.0.0) GO TO 100                                     RCP00740
01873*      21          YD=1000.*Y                                                  RCP00750
01874*           C         YD IS CROSSWIND DISTANCE IN METERS.                      RCP00760
01875*      22          DUM=YD/SY                                                   RCP00770
01876*      23          TEMP=0.5*DUM*DUM                                            RCP00780
01877*      24          IF (TEMP.GE.50.) GO TO 40                                   RCP00790
01878*      25          C1=EXP(TEMP)                                                RCP00800
01879*      26   100    IF (KST.GT.4) GO TO 120                                     RCP00810
01880*      27          IF (HL.LT.5000.) GO TO 200                                  RCP00820
01881*           C          IF STABLE CONDITION OR UNLIMITED MIXING HEIGHT,         RCP00830
01882*           C           USE EQUATION 3.2 IF Z = 0, OR EQ 3.1 FOR NON-ZERO Z.   RCP00840
01883*           C           (EQUATION NUMBERS REFER TO WORKBOOK OF ATMOSPHERIC DISPERSION RCP00850
01884*           C           ESTIMATES.)                                            RCP00860
01885*      28   120    C2=2.*SZ*SZ                                                 RCP00870
01886*      29          IF (Z) 40,130,150                                           RCP00880
01887*           C        NOTE: AN ERRONEOUS NEGATIVE Z WILL RESULT IN ZERO CONCENTRATIONSRCP00890
01888*           C                                                                  RCP00900
01889*           C->->->->SECTION RCP.C - STABLE OR UNLIMITED MIXING, Z IS ZERO.    RCP00910
01890*           C                                                                  RCP00920
01891*      30   130    C3=H*H/C2                                                   RCP00930
01892*      31          IF (C3.GE.50.) GO TO 40                                     RCP00940
01893*      32          A2=1./EXP(C3)                                               RCP00950
01894*           C          MADE EQUATION 3.2.                                      RCP00960
01895*      33          RC=A2/(3.14159*UPL*SY*SZ*C1)                                RCP00970
01896*      34          RETURN                                                      RCP00980
01897*           C                                                                  RCP00990
01898*           C->->->->SECTION RCP.D - STABLE OR UNLIMITED MIXING, Z IS NON-ZERO. RCP01000
01899*           C
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SUBROUTINE RCP

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01900*      35    150   A2=0.                                                            RCP01010
01901*      36          A3=0.                                                            RCP01020
01902*      37          CA=Z-H                                                           RCP01030
01903*      38          CB=Z+H                                                           RCP01040
01904*      39          C3=CA*CA/C2                                                      RCP01050
01905*      40          C4=CB*CB/C2                                                      RCP01060
01906*      41          IF (C3.GE.50.) GO TO 170                                         RCP01070
01907*      42          A2=1./EXP(C3)                                                    RCP01080
01908*      43    170   IF (C4.GE.50.) GO TO 190                                         RCP01090
01909*      44          A3=1./EXP(C4)                                                    RCP01100
01910*            C        WADE EQUATION 3.1.                                            RCP01110
01911*      45    190   RC=(A2+A3)/(6.28318*UPL*SY*SZ*C1)                                RCP01120
01912*      46          RETURN                                                           RCP01130
01913*            C                                                                      RCP01140
01914*            C->->->->SECTION RCP.E - UNSTABLE, ASSURED OF UNIFORM MIXING.          RCP01150
01915*            C                                                                      RCP01160
01916*            C          IF SIGMA-Z IS GREATER THAN 1.6 TIMES THE MIXING HEIGHT,     RCP01170
01917*            C           THE DISTRIBUTION BELOW THE MIXING HEIGHT IS UNIFORM WITH     RCP01180
01918*            C           HEIGHT REGARDLESS OF SOURCE HEIGHT OR RECEPTOR HEIGHT BECAUSE RCP01190
01919*            C           OF REPEATED EDDY REFLECTIONS FROM THE GROUND AND THE MIXING HTRCP01200
01920*      47    200   IF (SZ/HL.LE.1.6) GO TO 220                                      RCP01210
01921*            C        WADE EQUATION 3.5.                                            RCP01220
01922*      48          RC=1./(2.5066*UPL*SY*HL*C1)                                      RCP01230
01923*      49          RETURN                                                           RCP01240
01924*            C        INITIAL VALUE OF AN SET = 0.                                  RCP01250
01925*            C         AN - THE NUMBER OF TIMES THE SUMMATION TERM IS EVALUATED     RCP01260
01926*            C              AND ADDED IN.                                           RCP01270
01927*      50    220   AN=0.                                                            RCP01280
01928*      51          IF (Z) 40,380,230                                                RCP01290
01929*            C                                                                      RCP01300
01930*            C->->->->SECTION RCP.F - UNSTABLE, CALCULATE MULTIPLE EDDY             RCP01310
01931*            C                           REFLECTIONS, Z IS NON-ZERO.                RCP01320
01932*            C                                                                      RCP01330
01933*            C        STATEMENTS 220-260 CALCULATE RC, THE RELATIVE CONCENTRATION,  RCP01340
01934*            C          USING THE EQUATION DISCUSSED ABOVE.  SEVERAL INTERMEDIATE   RCP01350
01935*            C          VARIABLES ARE USED TO AVOID REPEATING CALCULATIONS.         RCP01360
01936*            C          CHECKS ARE MADE TO BE SURE THAT THE ARGUMENT OF THE         RCP01370
01937*            C          EXPONENTIAL FUNCTION IS NEVER GREATER THAN 50 (OR LESS THAN RCP01380
01938*            C          -50).                                                       RCP01390
01939*            C       CALCULATE MULTIPLE EDDY REFLECTIONS FOR RECEPTOR HEIGHT Z.     RCP01400
01940*      52    230   A1=1./(6.28318*UPL*SY*SZ*C1)                                     RCP01410
01941*      53          C2=2.*SZ*SZ                                                      RCP01420
01942*      54          A2=0.                                                            RCP01430
01943*      55          A3=0.                                                            RCP01440
01944*      56          CA=Z-H                                                           RCP01450
01945*      57          CB=Z+H                                                           RCP01460
01946*      58          C3=CA*CA/C2                                                      RCP01470
01947*      59          C4=CB*CB/C2                                                      RCP01480
01948*      60          IF (C3.GE.50.) GO TO 250                                         RCP01490
01949*      61          A2=1./EXP(C3)                                                    RCP01500
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01950*      62    250   IF (C4.GE.50.) GO TO 270                                                  RCP01510
01951*      63          A3=1./EXP(C4)                                                             RCP01520
01952*      64    270   SUM=0.                                                                    RCP01530
01953*      65          THL=2.*HL                                                                 RCP01540
01954*      66    280   AN=AN+1.                                                                  RCP01550
01955*      67          A4=0.                                                                     RCP01560
01956*      68          A5=0.                                                                     RCP01570
01957*      69          A6=0.                                                                     RCP01580
01958*      70          A7=0.                                                                     RCP01590
01959*      71          C5=AN*THL                                                                 RCP01600
01960*      72          CC=CA-C5                                                                  RCP01610
01961*      73          CD=CB-C5                                                                  RCP01620
01962*      74          CE=CA+C5                                                                  RCP01630
01963*      75          CF=CB+C5                                                                  RCP01640
01964*      76          C6=CC*CC/C2                                                               RCP01650
01965*      77          C7=CD*CD/C2                                                               RCP01660
01966*      78          C8=CE*CE/C2                                                               RCP01670
01967*      79          C9=CF*CF/C2                                                               RCP01680
01968*      80          IF (C6.GE.50.) GO TO 300                                                  RCP01690
01969*      81          A4=1./EXP(C6)                                                             RCP01700
01970*      82    300   IF (C7.GE.50.) GO TO 320                                                  RCP01710
01971*      83          A5=1./EXP(C7)                                                             RCP01720
01972*      84    320   IF (C8.GE.50.) GO TO 340                                                  RCP01730
01973*      85          A6=1./EXP(C8)                                                             RCP01740
01974*      86    340   IF (C9.GE.50.) GO TO 360                                                  RCP01750
01975*      87          A7=1./EXP(C9)                                                             RCP01760
01976*      88    360   T=A4+A5+A6+A7                                                             RCP01770
01977*      89          SUM=SUM+T                                                                 RCP01780
01978*      90          IF (T.GE.0.01) GO TO 280                                                  RCP01790
01979*      91          RC=A1*(A2+A3+SUM)                                                         RCP01800
01980*      92          RETURN                                                                    RCP01810
01981*            C                                                                               RCP01820
01982*            C->->->->SECTION RCP.6 - UNSTABLE, CALCULATE MULTIPLE EDDY                      RCP01830
01983*            C                           REFLECTIONS, Z IS ZERO.                             RCP01840
01984*            C                                                                               RCP01850
01985*            C         CALCULATE MULTIPLE EDDY REFLECTIONS FOR GROUND LEVEL RECEPTOR         RCP01860
01986*            C         HEIGHT.                                                               RCP01870
01987*      93    380   A1=1./(6.2831*UPL*SY*SZ*C1)                                               RCP01880
01988*      94          A2=0.                                                                     RCP01890
01989*      95          C2=2.*SZ*SZ                                                               RCP01900
01990*      96          C3=H*H/C2                                                                 RCP01910
01991*      97          IF (C3.GE.50.) GO TO 400                                                  RCP01920
01992*      98          A2=2./EXP(C3)                                                             RCP01930
01993*      99    400   SUM=0.                                                                    RCP01940
01994*     100          THL=2.*HL                                                                 RCP01950
01995*     101    410   AN=AN+1.                                                                  RCP01960
01996*     102          A4=0.                                                                     RCP01970
01997*     103          A6=0.                                                                     RCP01980
01998*     104          C5=AN*THL                                                                 RCP01990
01999*     105          CC=H-C5                                                                   RCP02000
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                         SUBROUTINE RCP

02000*        106          CE=H*C5                                                  RCP02010
02001*        107          C6=CC*CC/C2                                              RCP02020
02002*        108          C8=CE*CE/C2                                              RCP02030
02003*        109          IF (C6.GE.50.) GO TO 430                                 RCP02040
02004*        110          A8=2./EXP(C6)                                            RCP02050
02005*        111     430  IF (C8.GE.50.) GO TO 450                                 RCP02060
02006*        112          A6=2./EXP(C8)                                            RCP02070
02007*        113     450  T=A8+A6                                                  RCP02080
02008*        114          SUM=SUM+T                                                RCP02090
02009*        115          IF (T.GE.0.01) GO TO 410                                 RCP02100
02010*        116          RC=A1*(A2+SUM)                                           RCP02110
02011*        117          RETURN                                                   RCP02120
02012*              C                                                               RCP02130
02013*              C->->->->SECTION RCP.H - FORMAT                                 RCP02140
02014*              C                                                               RCP02150
02015*              C** *  SECTIONS OF SUBROUTINE RCP.                              RCP02160
02016*              C          SECTION RCP.A -  COMMON.                             RCP02170
02017*              C          SECTION RCP.B -  EXPLANATIONS AND COMPUTATIONS COMMON TO ALL  RCP02180
02018*              C                              CONDITIONS.                      RCP02190
02019*              C          SECTION RCP.C -  STABLE OR UNLIMITED MIXING, Z IS ZERO.      RCP02200
02020*              C          SECTION RCP.D -  STABLE OR UNLIMITED MIXING, Z IS NON-ZERO.  RCP02210
02021*              C          SECTION RCP.E -  UNSTABLE, ASSURED OF UNIFORM MIXING.        RCP02220
02022*              C          SECTION RCP.F -  UNSTABLE, CALCULATE MULTIPLE EDDY           RCP02230
02023*              C                              REFLECTIONS; Z IS NON-ZERO.      RCP02240
02024*              C          SECTION RCP.G -  UNSTABLE, CALCULATE MULTIPLE EDDY           RCP02250
02025*              C                              REFLECTIONS; Z IS ZERO.          RCP02260
02026*              C          SECTION RCP.H -  FORMAT.                             RCP02270
02027*              C                                                               RCP02280
02028*        118     470  FORMAT (1H0,'BOTH H AND Z ARE ABOVE THE MIXING HEIGHT SO A RELIABLRCP02290
02029*                    *E COMPUTATION CAN NOT BE MADE.')                         RCP02300
02030*              C                                                               RCP02310
02031*        119          END                                                      RCP02320
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SUBROUTINE RCP

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SYMBOL    = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = =

20     -   6      8*
40     -   7      8      10*    12     28     29     31     51
50     -   5      7      7      12*
70     -   14     19*
100    -   20     26*
120    -   26     28*
130    -   29     30*
150    -   29     35*
170    -   41     43*
190    -   43     45*
200    -   27     47*
220    -   47     50*
230    -   51     52*
250    -   60     62*
270    -   62     64*
280    -   66*    90
300    -   80     82*
320    -   82     84*
340    -   84     86*
360    -   86     88*
380    -   51     93*
400    -   97     99*
410    -   101*   115
430    -   109    111*
450    -   111    113*
470    -    9WP   118*
A1     -   52=    91     93=    116
A2     -   32=    33     35=    42=    45     54=    61=    91     94=    98=
           116
A3     -   36=    44=    45     55=    63=    91
A4     -   67=    81=    88     102=   110=   113
A5     -   68=    83=    88
A6     -   69=    85=    88     103=   112=   113
A7     -   70=    87=    88
AN     -   50=    66=    66     71     101=   101    104
C1     -   19=    25=    33     45     48     52     97
C2     -   28=    30     39     40     53=    58     59     76     77     78
           79     95=    96     107    108
C3     -   30=    31     32     39=    41     42     58=    60     61     96=
           97     99
C4     -   40=    43     44     50=    62     63
C5     -   71=    72     73     74     75     104=   105    106
C6     -   76=    80     81     107=   109    110
C7     -   77=    82     83
C8     -   78=    84     85     108=   111    112
C9     -   79=    86     87
CA     -   37=    39     39     56=    58     58     72     74
CB     -   38=    40     40     57=    59     59     73     75
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                              SUBROUTINE RCP

CC       -   72=     76      76      105=    107     107
CD       -   73=     77      77
CE       -   74=     78      78      106=    108     108
CF       -   75=     79      79
DELH     -    3C0    15
DUM      -   15=     16=     16      16      17      18      22 =    23      23
EXP      -   25      32      42      44      61      63      81      83      85      87
             98      110     112
H        -    3C0    6       30      30      37      38      56      57      96      96
            105      106
HL       -    3C0    6       7       8       27      47      48      65      100
IO       -    4=     9WR
IOPT     -    2C0    14
KST      -    3C0    5       26
NPOR     -    2C0
NPR      -    3C0
PGYZ     -   13
RC       -    3C0    10=     33=     45=     48=     91=     116 =
RCP      -    1EY
SQRT     -   17      18
SUM      -   64=     89=     89      91      99=     114 =   114     116
SY       -    3C0    17=     17      17      22      33      45      48      52      93
SZ       -    3C0    18=     18      19      28      28      33      45      47      52
             53      53      93      95      95
T        -   88=     89      90      113=    114     115
TEMP     -   23=     24      25
THL      -   65=     71      100=    104
UPL      -    3C0    33      45      48      52      93
X        -    3C0    12
Y        -    3C0    20      21
YD       -   21=     22
Z        -    3C0    7       8       23      37      38      51      56      57
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 02303*        1            SUBROUTINE PGYZ                                                  PYZ00010
 02304*               C        VERTICAL DISPERSION PARAMETER VALUE, SZ DETERMINED BY         PYZ00020
 02305*               C         SZ = A * X ** B WHERE A AND B ARE FUNCTIONS OF BOTH STABILITY PYZ00030
 02306*               C         AND RANGE OF X.                                              PYZ00040
 02307*               C        HORIZONTAL DISPERSION PARAMETER VALUE, SY DETERMINED BY       PYZ00050
 02308*               C         LOGARITHMIC INTERPOLATION OF PLUME HALF-ANGLE ACCORDING TO   PYZ00060
 02309*               C         DISTANCE AND CALCULATION OF 1/2.15 TIMES HALF-ARC LENGTH.    PYZ00070
 02310*        2            COMMON /MPR/ IPL,Z,H,HL,X,Y,KST,DELH,SY,SZ,RC                    PYZ00080
 02311*        3            DIMENSION XA(7), XB(2), XD(5), XE(8), XF(9), AA(8), BA(8), AB(3), PYZ00090
 02312*                    1BB(3), AD(6), BD(6), AE(9), BE(9), AF(10), BF(10)                PYZ00100
 02313*        4            DATA XA /.5,.4,.3,.25,.2,.15,.1/                                 PYZ00110
 02314*        5            DATA XB /.4,.2/                                                  PYZ00120
 02315*        6            DATA XD /30.,10.,3.,1.,.3/                                       PYZ00130
 02316*        7            DATA XE /40.,20.,10.,4.,2.,1.,.3,.1/                             PYZ00140
 02317*        8            DATA XF /60.,30.,15.,7.,3.,2.,1.,.7,.2/                          PYZ00150
 02318*        9            DATA AA /453.85,346.75,258.89,217.41,179.52,170.22,158.08,122.8/ PYZ00160
 02319*       10            DATA BA /2.1166,1.7283,1.4094,1.2089,1.1262,1.0932,1.0542,.9447/ PYZ00170
 02320*       11            DATA AB /109.30,98.483,90.673/                                   PYZ00180
 02321*       12            DATA BB /1.0971,0.98332,0.93198/                                 PYZ00190
 02322*       13            DATA AD /44.053,36.650,33.504,32.093,32.093,34.459/              PYZ00200
 02323*       14            DATA BD /0.51179,0.56589,0.60486,0.64403,0.81066,0.86974/        PYZ00210
 02324*       15            DATA AE /47.618,35.420,26.970,24.703,22.534,21.628,21.628,23.331,2PYZ00220
 02325*                    14.26/                                                            PYZ00230
 02326*       16            DATA BE /0.29592,0.37615,0.46713,0.50527,0.57154,0.63077,0.75660,0PYZ00240
 02327*                    1.81956,0.8366/                                                   PYZ00250
 02328*       17            DATA AF /34.219,27.074,22.651,17.836,16.187,14.823,13.953,13.953,1PYZ00260
 02329*                    14.457,15.209/                                                    PYZ00270
 02330*       18            DATA BF /0.21716,0.27436,0.32681,0.41507,0.46490,0.58503,0.63227,0PYZ00280
 02331*                    1.68465,0.78407,0.81558/                                          PYZ00290
 02332*       19            XY=X                                                             PYZ00300
 02333*       20            GO TO (10,40,70,80,110,140), KST                                 PYZ00310
 02334*               C        STABILITY A                                                   PYZ00320
 02335*       21      10    TH=(24.167-2.5334*ALOG(XY))/57.2958                              PYZ00330
 02336*       22            IF (X.GT.3.11) GO TO 170                                         PYZ00340
 02337*       23            DO 20 ID=1,7                                                     PYZ00350
 02338*       24            IF (X.GE.XA(ID)) GO TO 30                                        PYZ00360
 02339*       25      20    CONTINUE                                                         PYZ00370
 02340*       26            ID=8                                                             PYZ00380
 02341*       27      30    SZ=AA(ID)*X**BA(ID)                                              PYZ00390
 02342*       28            GO TO 190                                                        PYZ00400
 02343*               C        STABILITY B                                                   PYZ00410
 02344*       29      40    TH=(18.333-1.8096*ALOG(XY))/57.2958                              PYZ00420
 02345*       30            IF (X.GT.35.) GO TO 170                                          PYZ00430
 02346*       31            DO 50 ID=1,2                                                     PYZ00440
 02347*       32            IF (X.GE.XB(ID)) GO TO 60                                        PYZ00450
 02348*       33      50    CONTINUE                                                         PYZ00460
 02349*       34            ID=3                                                             PYZ00470
 02350*       35      60    SZ=AB(ID)*X**BB(ID)                                              PYZ00480
 02351*       36            GO TO 190                                                        PYZ00490
 02352*               C        STABILITY C                                                   PYZ00500
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SUBROUTINE PGYZ

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02353*          37    70    TH=(12.5-1.0857*ALOG(XY))/57.2958                           PYZ00510
02354*          38          SZ=61.141*X**0.91465                                        PYZ00520
02355*          39          GO TO 180                                                   PYZ00530
02356*                C        STABILITY D                                              PYZ00540
02357*          40    80    TH=(8.3333-0.72382*ALOG(XY))/57.2958                        PYZ00550
02358*          41          DO 90 ID=1,5                                                PYZ00560
02359*          42          IF (X.GE.XD(ID)) GO TO 100                                  PYZ00570
02360*          43    90    CONTINUE                                                    PYZ00580
02361*          44          ID=6                                                        PYZ00590
02362*          45    100   SZ=AD(ID)*X**BD(ID)                                         PYZ00600
02363*          46          GO TO 180                                                   PYZ00610
02364*                C        STABILITY E                                              PYZ00620
02365*          47    110   TH=(6.25-0.54287*ALOG(XY))/57.2958                          PYZ00630
02366*          48          DO 120 ID=1,8                                               PYZ00640
02367*          49          IF (X.GE.XE(ID)) GO TO 130                                  PYZ00650
02368*          50    120   CONTINUE                                                    PYZ00660
02369*          51          ID=9                                                        PYZ00670
02370*          52    130   SZ=AE(ID)*X**BE(ID)                                         PYZ00680
02371*          53          GO TO 180                                                   PYZ00690
02372*                C        STABILITY F                                              PYZ00700
02373*          54    140   TH=(4.1667-0.36191*ALOG(XY))/57.2958                        PYZ00710
02374*          55          DO 150 ID=1,9                                               PYZ00720
02375*          56          IF (X.GE.XF(ID)) GO TO 160                                  PYZ00730
02376*          57    150   CONTINUE                                                    PYZ00740
02377*          58          ID=10                                                       PYZ00750
02378*          59    160   SZ=AF(ID)*X**BF(ID)                                         PYZ00760
02379*          60          GO TO 180                                                   PYZ00770
02380*          61    170   SZ=5000.                                                    PYZ00780
02381*          62          GO TO 190                                                   PYZ00790
02382*          63    180   IF (SZ.GT.5000.) SZ=5000.                                   PYZ00800
02383*          64    190   SY=465.116*XY*SIN(TH)/COS(TH)                               PYZ00810
02384*                C        465.116 = 1000. (M/KM) / 2.15                            PYZ00820
02385*          65          RETURN                                                      PYZ00830
02386*                C                                                                 PYZ00840
02387*          66          END                                                         PYZ00850
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                              SUBROUTINE PGYZ

     SYMBOL      = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = = = =
      10      -    20      21*
      20      -    23      25*
      30      -    24      27*
      40      -    20      29*
      50      -    31      33*
      60      -    32      35*
      70      -    20      37*
      80      -    20      40*
      90      -    41      43*
     100      -    42      45*
     110      -    20      47*
     120      -    48      50*
     130      -    49      52*
     140      -    20      54*
     150      -    55      57*
     160      -    56      59*
     170      -    22      30      61*
     180      -    36      39      46      53      60      63*
     190      -    28      62      64*
     AA       -     3DI     90A    27
     AB       -     3DI    110A    35
     AD       -     3DI    130A    45
     AF       -     3DI    150A    52
     AF       -     3DI    170A    59
     ALOG     -    21      29      37      40      47      54
     BA       -     3DI    100A    27
     BB       -     3DI    120A    35
     BD       -     3DI    140A    45
     BE       -     3DI    160A    52
     BF       -     3DI    180A    59
     COS      -    64
     DELH     -     2C0
     H        -     2C0
     HI       -     2C0
     ID       -    23      24      26=     27      27      31      32      34=     35      35
                   41      42      44=     45      45      48      49      51=     52      52
                   55      56      58=     59      59
     KST      -     2C0    20
     MPR      -     2C0
     PGYZ     -     1FY
     RC       -     2C0
     SIN      -    64
     SY       -     2C0    64=
     SZ       -     2C0    27=     35=     38=     45=     52=     59=     61=     63      63=
     TH       -    21=     29=     37=     40=     47=     54=     64      64
     UPL      -     2C0
     Y        -     2C0    19      22      24      27      30      32      35      38      42
                   45      49      52      56      59
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                                   SUBROUTINE PGYZ

    XA      -     3DI     4DA    24
    XB      -     3DI     5DA    32
    XD      -     3DI     6DA    42
    XE      -     3DI     7DA    49
    XF      -     3DI     8DA    56
    XY      -     19=     21     29      37      40      47      54      68
    Y       -     2C0
    Z       -     2C0
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SUBROUTINE RANK(L)

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01750*          1            SUBROUTINE RANK (L)                                            RNK00010
01751*                C         CALLED BY MPTER TO ARRANGE CONCENTRATIONS OF VARIOUS AVG     RNK00020
01752*                C         TIMES INTO HIGH-FIVE TABLES...THAT IS, ARRAYS STORING        RNK00030
01753*                C         THE HIGHEST FIVE CONCENTRATIONS FOR EACH RECEPTOR FOR        RNK00040
01754*                C         EACH AVG TIME.                                               RNK00050
01755*                C         VARIABLES OUTPUT:                                            RNK00060
01756*                C              HMAXA(J,K,L)  CONCENTRATIONS ACCORDING TO               RNK00070
01757*                C                   J : RANK OF CONC. (1-5)                            RNK00080
01758*                C                   K : RECEPTOR NUMBER                                RNK00090
01759*                C                   L : AVG TIME                                       RNK00100
01760*                C              NDAY(J,K,L) : ASSOCIATED DAY OF CONC.                   RNK00110
01761*                C              IHR(J,K,L) : ENDING HOUR OF CONC.                       RNK00120
01762*          2            COMMON/MR/HMAXA(5,180,5),NDAY(5,180,5),IHR(5,180,5),CONC(180,5),  RNK00130
01763*                      1       JDAY,NR                                                 RNK00140
01764*          3            COMMON /MPO/ NRECEP,NAVG,NB,LH,NPT,IDATE(2),RREC(180),SREC(180),ZRRNK00150
01765*                      1(180),ELR(180),PHCHI(180),PHSIGS(180,26),HSAV(250),DSAV(250),PCH(RNK00160
01766*                      2180),PSIGS(180,26),IPOL                                       RNK00170
01767*          4            IO=6                                                           RNK00180
01768*          5            DO 50 K=1,NRECEP                                               RNK00190
01769*          6            IF (CONC(K,L).LE.HMAXA(5,K,L)) GO TO 50                        RNK00200
01770*          7            DO 10 J=1,5                                                    RNK00210
01771*          8            IF (CONC(K,L).GT.HMAXA(J,K,L)) GO TO 20                        RNK00220
01772*                C           CONCENTRATION IS ONE OF THE TOP FIVE                       RNK00230
01773*          9     10     CONTINUE                                                       RNK00240
01774*         10            WRITE (IO,70)                                                  RNK00250
01775*         11            GO TO 50                                                       RNK00260
01776*                C         THE FOLLOWING DO-LOOP HAS THE EFFECT OF INSERTING A NEW      RNK00270
01777*                C         CONCENTRATION ENTRY INTO ITS PROPER POSITION WHILE SHIFTING  RNK00280
01778*                C         DOWN THE 'OLD' LOWER CONCENTRATIONS THUS ESTABLISHING THE    RNK00290
01779*                C         'HIGH-FIVE' CONCENTRATION TABLE.                             RNK00300
01780*         12     20     IF (J.EQ.5) GO TO 40                                           RNK00310
01781*         13            DO 30 IJ=4,J,-1                                                RNK00320
01782*         14            IJP1=IJ+1                                                      RNK00330
01783*         15            HMAXA(IJP1,K,L)=HMAXA(IJ,K,L)                                  RNK00340
01784*         16            NDAY(IJP1,K,L) = NDAY(IJ,K,L)                                  RNK00350
01785*         17     30     IHR(IJP1,K,L) = IHR(IJ,K,L)                                    RNK00360
01786*                C           INSERT LATEST CONC, DAY AND ENDING HR INTO THE             RNK00370
01787*                C           PROPER RANK IN THE HIGH-FIVE TABLE                         RNK00380
01788*         18     40     HMAXA(J,K,L)=CONC(K,L)                                         RNK00390
01789*         19            NDAY(J,K,L) = JDAY                                             RNK00400
01790*         20            IHR(J,K,L) = LH                                                RNK00410
01791*         21     50     CONTINUE                                                       RNK00420
01792*         22            DO 60 K=1,NRECEP                                               RNK00430
01793*         23            CONC(K,L)=0.                                                   RNK00440
01794*         24     60     CONTINUE                                                       RNK00450
01795*         25            RETURN                                                         RNK00460
01796*                C                                                                    RNK00470
01797*         26     70     FORMAT (1X,'   ****ERROR IN FINDING THE MAX CONCENTRATION****')  RNK00480
01798*                C                                                                    RNK00490
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                              SUBROUTINE RANK(L)

01799*          27          END                                                    RNK00500

        SYMBOL     = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = =

        10      -     7       9*
        20      -     8      12*
        30      -    13      17*
        40      -    12      18*
        50      -     5       6      11      21*
        60      -    22      24*
        70      -    10WR    26*
        CONC    -     2CO     6       8      18      23=
        DSAV    -     3CO
        ELR     -     3CO
        HMAXA   -     2CO     6       8      15=     15      18=
        HSAV    -     3CO
        IDATE   -     3CO
        IHR     -     2CO    17=     17      20=
        IJ      -    13      14      15      16      17
        IJP1    -    14=     15      16      17
        IO      -     8=     10WR
        IPOL    -     3CO
        J       -     7       8      12      13      18      19      20
        JDAY    -     2CO    19
        K       -     5       6       6       8       8      15      15      16      16      17
                     17      18      18      19      20      22      23
        L       -     1AG     6       6       8       8      15      15      16      16      17
                     17      18      18      19      20      23
        LH      -     3CO    20
        MPO     -     3CO
        MR      -     2CO
        NAVG    -     3CO
        NN      -     3CO
        NDAY    -     2CO    16=     16      19=
        NPT     -     3CO
        NR      -     2CO
        NPRECP  -     3CO     5      22
        PCHI    -     3CO
        PHCHI   -     3CO
        PHSIGS  -     3CO
        PSIGS   -     3CO
        RANK    -     1EY
        RREC    -     3CO
        SREC    -     3CO
        ZR      -     3CO
        -+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
01443*      1           SUBROUTINE OUTHR                                                  OUT00010
01444*             C       THIS SUBROUTINE PROVIDES OUTPUT CONCENTRATIONS IN             OUT00020
01445*             C       MICROGRAMS PER CUBIC METER FOR EACH HOUR IN TWO WAYS:         OUT00030
01446*             C          1) CONTRIBUTIONS FROM SIGNIFICANT SOURCES, AND             OUT00040
01447*             C          2) SUMMARIES.                                               OUT00050
01448*             C       BEYOND ENTRY POINT OUTAVG THE SUBROUTINE PROVIDES             OUT00060
01449*             C       CONCENTRATION OUTPUT FOR EACH AVERAGING PERIOD AGAIN          OUT00070
01450*             C       IN THE ABOVE MANNER.                                          OUT00080
01451*             C                                                                     OUT00090
01452*             C->->->->SECTION OUTHR.A - COMMON, DIMENSION, AND DATA.               OUT00100
01453*             C                                                                     OUT00110
01454*      2           COMMON /MPOR/ IOPT(25)                                            OUT00120
01455*      3           COMMON /MPO/ NRECEP,NAVG,NB,LH,NPT,IDATE(2),RREC(180),SREC(180),ZROUT00130
01456*                 1(180),ELR(180),PHCHI(180),PHSIGS(180,26),HSAV(250),DSAV(250),PCHI(OUT00140
01457*                 2180),PSIGS(180,26),IPOL                                          OUT00150
01458*      4           COMMON /MO/ QTHETA(24),QU(24),IKST(24),QHL(24),QTEMP(24),MPS(25),NOUT00160
01459*                 1SIGP,IO,LINE1(20),LINE2(20),LINE3(20),RNAME(2,180),IRANK(180),STAROUT00170
01460*                 2(5,180)                                                          OUT00180
01461*      5           DIMENSION IPOLT(2)                                                OUT00190
01462*      6           DATA IPOLT /'SO2 ','PART'/                                        OUT00200
01463*      7           IPOLU=IPOLT(1)                                                    OUT00210
01464*      8           IF (IPOL.EQ.4) IPOLU=IPOLT(2)                                     OUT00220
01465*             C       OPTION(11)- PRINT ONLY THE HOURLY SUMMARIES.                  OUT00230
01466*      9           IF (IOPT(11).EQ.1) GO TO 100                                      OUT00240
01467*             C                                                                     OUT00250
01468*             C->->->->SECTION OUTHR.B - WRITE HOURLY CONTRIBUTION TITLE.           OUT00260
01469*             C                                                                     OUT00270
01470*     10           WRITE (IO,750) LINE1,LINE2,LINE3                                  OUT00280
01471*     11           WRITE (IO,760)IPOLU,IDATE,LH                                      OUT00290
01472*             C                                                                     OUT00300
01473*             C->->->->SECTION OUTHR.C - WRITE HOURLY MET DATA.                     OUT00310
01474*             C                                                                     OUT00320
01475*     12           IF (IOPT(12).EQ.1) GO TO 10                                       OUT00330
01476*     13           WRITE (IO,450)                                                    OUT00340
01477*     14           WRITE (IO,460) LH,QTHETA(LH),QU(LH),QHL(LH),QTEMP(LH),IKST(LH)    OUT00350
01478*             C                                                                     OUT00360
01479*             C->->->->SECTION OUTHR.D - WRITE FINAL PLUME HEIGHT AND DISTANCE      OUT00370
01480*             C                              FINAL RISE.                            OUT00380
01481*             C                                                                     OUT00390
01482*     15      10   IF (IOPT(13).EQ.1) GO TO 20                                       OUT00400
01483*     16           WRITE (IO,470) (I,I=1,10)                                         OUT00410
01484*             C       HSAV ARE THE CALCULATED PLUME HEIGHTS FOR THIS HOUR           OUT00420
01485*     17           WRITE (IO,480) (HSAV(I),I=1,NPT)                                  OUT00430
01486*     18           WRITE (IO,490) (DSAV(I),I=1,NPT)                                  OUT00440
01487*             C                                                                     OUT00450
01488*             C->->->->SECTION OUTHR.E - WRITE HRLY SIGNIFICANT SOURCE CONTRIB.     OUT00460
01489*             C                                                                     OUT00470
01490*     19      20   IF (NSIGP.GT.10) GO TO 40                                         OUT00480
01491*             C       PRINT FIRST PAGE OF OUTPUT AND TOTALS FOR 10 OR LESS SIGNIF SOUOUT00490
01492*     20           WRITE (IO,770)                                                    OUT00500
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SUBROUTINE OUTHR

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01493*        21            WRITE (IO,380) (I,I=1,NSIGP)                                              OUT00510
01494*        22            WRITE (IO,390)                                                            OUT00520
01495*        23            WRITE (IO,380) (MPS(I),I=1,NSIGP)                                         OUT00530
01496*        24            WRITE (IO,400)                                                            OUT00540
01497*        25            DO 30 K=1,NRECEP                                                          OUT00550
01498*        26            WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PHSIGS(K,I),I=1,NSIGP)              OUT00560
01499*              C          PRINT TOTALS                                                           OUT00570
01500*        27            WRITE (IO,420) PHSIGS(K,26),PHCHI(K)                                      OUT00580
01501*        28      30    CONTINUE                                                                  OUT00590
01502*        29            GO TO 100                                                                 OUT00600
01503*              C          PRINT FIRST PAGE FOR MORE THAN 10 SIGNIFICANT SOURCES.                 OUT00610
01504*        30      40    WRITE (IO,370)                                                            OUT00620
01505*        31            WRITE (IO,380) (I,I=1,10)                                                 OUT00630
01506*        32            WRITE (IO,430) (MPS(I),I=1,10)                                            OUT00640
01507*        33            WRITE (IO,400)                                                            OUT00650
01508*        34            DO 50 K=1,NRECEP                                                          OUT00660
01509*        35      50    WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PHSIGS(K,I),I=1,10)                 OUT00670
01510*        36            IF (NSIGP.GT.20) GO TO 70                                                 OUT00680
01511*              C          PRINT SECOND PAGE AND TOTALS FOR 11 TO 20 SIGNIFICANT SOURCES         OUT00690
01512*        37            WRITE (IO,350) LINE1,LINE2,LINE3                                          OUT00700
01513*        38            WRITE (IO,360)IPOLU,IDATE,LH                                              OUT00710
01514*        39            WRITE (IO,370)                                                            OUT00720
01515*        40            WRITE (IO,380) (I,I=11,NSIGP)                                             OUT00730
01516*        41            WRITE (IO,390)                                                            OUT00740
01517*        42            WRITE (IO,380) (MPS(I),I=11,NSIGP)                                        OUT00750
01518*        43            WRITE (IO,400)                                                            OUT00760
01519*        44            DO 60 K=1,NRECEP                                                          OUT00770
01520*        45            WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PHSIGS(K,I),I=11,NSIGP)             OUT00780
01521*        46      60    WRITE (IO,420) PHSIGS(K,26),PHCHI(K)                                      OUT00790
01522*        47            GO TO 100                                                                 OUT00800
01523*              C          WRITE SECOND PAGE FOR MORE THAN 20 SIGNIFICANT SOURCES.                OUT00810
01524*        48      70    WRITE (IO,350) LINE1,LINE2,LINE3                                          OUT00820
01525*        49            WRITE (IO,360)IPOLU,IDATE,LH                                              OUT00830
01526*        50            WRITE (IO,370)                                                            OUT00840
01527*        51            WRITE (IO,380) (I,I=11,20)                                                OUT00850
01528*        52            WRITE (IO,430) (MPS(I),I=11,20)                                           OUT00860
01529*        53            WRITE (IO,400)                                                            OUT00870
01530*        54            DO 80 K=1,NRECEP                                                          OUT00880
01531*        55      80    WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PHSIGS(K,I),I=11,20)                OUT00890
01532*        56            WRITE (IO,350) LINE1,LINE2,LINE3                                          OUT00900
01533*        57            WRITE (IO,360)IPOLU,IDATE,LH                                              OUT00910
01534*        58            WRITE (IO,370)                                                            OUT00920
01535*              C          WRITE LAST PAGE AND TOTALS FOR MORE THAN 20 SIGNIF. SOURCES.           OUT00930
01536*        59            WRITE (IO,380) (I,I=21,NSIGP)                                             OUT00940
01537*        60            WRITE (IO,390)                                                            OUT00950
01538*        61            WRITE (IO,390) (MPS(I),I=21,NSIGP)                                        OUT00960
01539*        62            WRITE (IO,400)                                                            OUT00970
01540*        63            DO 90 K=1,NRECEP                                                          OUT00980
01541*        64            WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PHSIGS(K,I),I=21,NSIGP)             OUT00990
01542*        65      90    WRITE (IO,420) PHSIGS(K,26),PHCHI(K)                                      OUT01000
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SUBROUTINE OUTHR

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01543*              C         OPTION(14): SKIP OUTPUT OF THE HOURLY SUMMARIES.             OUT01010
01544*      66      100   IF (IOPT(14).EQ.1) GO TO 170                                     OUT01020
01545*              C                                                                      OUT01030
01546*              C->->->->SECTION OUTHR.F - WRITE HOURLY SUMMARY TITLE.                 OUT01040
01547*              C                                                                      OUT01050
01548*      67            WRITE (IO,750) LINE1,LINE2,LINE3                                 OUT01060
01549*      68            WRITE (IO,440)IPOLU,IDATE,LH                                     OUT01070
01550*              C                                                                      OUT01080
01551*              C->->->->SECTION OUTHR.G - WRITE HOURLY MET DATA.                      OUT01090
01552*              C                                                                      OUT01100
01553*      69            IF (IOPT(15).EQ.1) GO TO 110                                     OUT01110
01554*      70            WRITE (IO,450)                                                   OUT01120
01555*      71            WRITE (IO,460) LH,QTHETA(LH),QU(LH),QHL(LH),QTEMP(LH),IKST(LH)   OUT01130
01556*              C                                                                      OUT01140
01557*              C->->->->SECTION OUTHR.H - WRITE FINAL PLUME HEIGHT AND                 OUT01150
01558*              C         DISTANCE TO FINAL RISE.                                      OUT01160
01559*              C                                                                      OUT01170
01560*      72      110   IF (IOPT(16).EQ.1) GO TO 120                                     OUT01180
01561*      73            WRITE (IO,470) (I,I=1,10)                                        OUT01190
01562*              C         HSAV ARE THE CALCULATED PLUME HEIGHTS FOR THIS HOUR          OUT01200
01563*      74            WRITE (IO,480) (HSAV(I),I=1,NPT)                                 OUT01210
01564*      75            WRITE (IO,490) (DSAV(I),I=1,NPT)                                 OUT01220
01565*              C                                                                      OUT01230
01566*              C->->->->SECTION OUTHR.I - WRITE HOURLY SUMMARY TABLE.                 OUT01240
01567*              C                                                                      OUT01250
01568*      76      120   WRITE (IO,500)                                                   OUT01260
01569*              C         CALCULATE GRAND TOTALS AND RANK CONCENTRATIONS               OUT01270
01570*      77            DO 130 K=1,NRECEP                                                OUT01280
01571*              C         HSAV IS USED AS A DUMMY VARIABLE FOR THE REMAINDER OF THIS   OUT01290
01572*              C         SUBROUTINE. IT IS ZEROED AGAIN IN PTR BEFORE ITS NORMAL USE. OUT01300
01573*      78      130   HSAV(K)=PHCHI(K)                                                 OUT01310
01574*              C         DETERMINE RANKING ACCORDING TO CONCENTRATION                 OUT01320
01575*      79            DO 150 I=1,NRECEP                                                OUT01330
01576*      80            CMAX=-1.0                                                        OUT01340
01577*      81            DO 140 K=1,NRECEP                                                OUT01350
01578*      82            IF (HSAV(K).LE.CMAX) GO TO 140                                   OUT01360
01579*      83            CMAX=HSAV(K)                                                     OUT01370
01580*      84            LMAX=K                                                           OUT01380
01581*      85      140   CONTINUE                                                         OUT01390
01582*      86            IRANK(LMAX)=I                                                    OUT01400
01583*      87            HSAV(LMAX)=-1.0                                                  OUT01410
01584*      88      150   CONTINUE                                                         OUT01420
01585*      89            DO 160 K=1,NRECEP                                                OUT01430
01586*      90            WRITE (IO,510) K,STAR(1,K),STAR(2,K),(RNAME(J,K),J=1,2),RREC(K),SOUT01440
01587*                   1EC(K),ZR(K),ELR(K),PHSIGS(K,26),PHCHI(K),IRANK(K)               OUT01450
01588*      91      160   CONTINUE                                                         OUT01460
01589*      92      170   RETURN                                                           OUT01470
01590*              C                                                                      OUT01480
01591*              C->->->->SECTION OUTHR.J - ENTRY POINT FOR AVERAGING TIME              OUT01490
01592*              C                                                                      OUT01500
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SUBROUTINE OUTHR

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01593*      93          ENTRY OUTAVG                                                   OUT01510
01594*              C        AT THIS ENTRY POINT, CONCENTRATION OUTPUT                 OUT01520
01595*              C     IN MICROGRAMS PER CUBIC METER ARE PRINTED FOR THE            OUT01530
01596*              C     AVERAGING PERIOD. CONTRIBUTIONS AND/OR SUMMARY               OUT01540
01597*              C     INFORMATION IS AVAILABLE.                                    OUT01550
01598*              C     AVERAGE CONCENTRATIONS OVER SPECIFIED TIME PERIOD            OUT01560
01599*      94          DO 190 K=1,NRECEP                                              OUT01570
01600*      95          PCHI(K)=PCHI(K)/NAVG                                           OUT01580
01601*      96          HSAV(K)=PCHI(K)                                                OUT01590
01602*      97          DO 180 I=1,26                                                  OUT01600
01603*      98    180   PSIGS(K,I)=PSIGS(K,I)/NAVG                                     OUT01610
01604*      99    190   CONTINUE                                                       OUT01620
01605*              C     OPTION(17): SKIP OUTPUT OF THE AVERAGED CONTRIBUTIONS.       OUT01630
01606*     100          IF (IOPT(17).EQ.1) GO TO 270                                   OUT01640
01607*              C->->->->SECTION OUTHR.K - WRITE AVERAGING-TIME SIGNIFICANT        OUT01650
01608*              C                   SOURCE CONTRIBUTIONS.                          OUT01660
01609*     101          WRITE (IO,350) LINE1,LINE2,LINE3                               OUT01670
01610*     102          WRITE (IO,520) NAVG,IPOLU,IDATE,NR                             OUT01680
01611*     103          IF (NSIGP.GT.10) GO TO 210                                     OUT01690
01612*              C     PRINT FIRST PAGE OF OUTPUT AND TOTALS FOR 10 OR LESS SIGNIF SOUOUT01700
01613*     104          WRITE (IO,380) (I,I=1,NSIGP)                                   OUT01710
01614*     105          WRITE (IO,390)                                                 OUT01720
01615*     106          WRITE (IO,380) (MPS(I),I=1,NSIGP)                              OUT01730
01616*     107          WRITE (IO,400)                                                 OUT01740
01617*     108          DO 200 K=1,NRECEP                                              OUT01750
01618*     109          WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PSIGS(K,I),I=1,NSIGP)    OUT01760
01619*              C     PRINT TOTALS                                                 OUT01770
01620*     110          WRITE (IO,420) PSIGS(K,26),PCHI(K)                             OUT01780
01621*     111    200   CONTINUE                                                       OUT01790
01622*     112          GO TO 270                                                      OUT01800
01623*              C     PRINT FIRST PAGE FOR MORE THAN 10 SIGNIF SOURCES             OUT01810
01624*     113    210   WRITE (IO,380) (I,I=1,10)                                      OUT01820
01625*     114          WRITE (IO,430) (MPS(I),I=1,10)                                 OUT01830
01626*     115          WRITE (IO,400)                                                 OUT01840
01627*     116          DO 220 K=1,NRECEP                                              OUT01850
01628*     117    220   WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PSIGS(K,I),I=1,10)       OUT01860
01629*     118          IF (NSIGP.GT.20) GO TO 240                                     OUT01870
01630*              C     PRINT SECOND PAGE AND TOTALS FOR 11 TO 20 SIGNIF SOURCES     OUT01880
01631*     119          WRITE (IO,350) LINE1,LINE2,LINE3                               OUT01890
01632*     120          WRITE (IO,520) NAVG,IPOLU,IDATE,NR                             OUT01900
01633*     121          WRITE (IO,380) (I,I=11,NSIGP)                                  OUT01910
01634*     122          WRITE (IO,390)                                                 OUT01920
01635*     123          WRITE (IO,380) (MPS(I),I=11,NSIGP)                             OUT01930
01636*     124          WRITE (IO,400)                                                 OUT01940
01637*     125          DO 230 K=1,NRECEP                                              OUT01950
01638*     126          WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PSIGS(K,I),I=11,NSIGP)   OUT01960
01639*     127    230   WRITE (IO,420) PSIGS(K,26),PCHI(K)                             OUT01970
01640*     128          GO TO 270                                                      OUT01980
01641*              C     WRITE SECOND PAGE FOR MORE THAN 20 SIGNIF SOURCES            OUT01990
01642*     129    240   WRITE (IO,350) LINE1,LINE2,LINE3                               OUT02000
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SUBROUTINE OUTHR

```
01643*       130               WRITE (IO,520) NAVG,IPOLU,IDATE,NR                              OUT02010
01644*       131               WRITE (IO,380) (I,I=11,20)                                      OUT02020
01645*       132               WRITE (IO,390) (MPS(I),I=11,20)                                 OUT02030
01646*       133               WRITE (IO,400)                                                  OUT02040
01647*       134               DO 250 K=1,NRECEP                                               OUT02050
01648*       135      250      WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PSIGS(K,I),I=11,20)       OUT02060
01649*       136               WRITE (IO,350) LINE1,LINE2,LINE3                                OUT02070
01650*       137               WRITE (IO,520) NAVG,IPOLU,IDATE,NR                              OUT02080
01651*                C           WRITE LAST PAGE AND TOTALS FOR MORE THAN 20 SIGNIF SOURCES   OUT02090
01652*       138               WRITE (IO,380) (I,I=21,NSIGP)                                   OUT02100
01653*       139               WRITE (IO,390)                                                  OUT02110
01654*       140               WRITE (IO,380) (MPS(I),I=21,NSIGP)                              OUT02120
01655*       141               WRITE (IO,400)                                                  OUT02130
01656*       142               DO 260 K=1,NRECEP                                               OUT02140
01657*       143               WRITE (IO,410) K,STAR(1,K),STAR(2,K),(PSIGS(K,I),I=21,NSIGP)    OUT02150
01658*       144      260      WRITE (IO,420) PSIGS(K,26),PCHI(K)                              OUT02160
01659*                C                                                                        OUT02170
01660*                C->->->->SECTION OUTHR.L - WRITE AVERAGING-TIME SUMMARY.                 OUT02180
01661*                C                                                                        OUT02190
01662*                C           OPTION(18): SKIP OUTPUT OF THE AVERAGED SUMMARIES.           OUT02200
01663*       145      270      IF (IOPT(18).EQ.1) GO TO 310                                    OUT02210
01664*       146               WRITE (IO,350) LINE1,LINE2,LINE3                                OUT02220
01665*       147               WRITE (IO,530) NAVG,IPOLU,IDATE,NR                              OUT02230
01666*       148               WRITE (IO,500)                                                  OUT02240
01667*                C           CALCULATE GRAND TOTALS AND RANK CONCENTRATIONS               OUT02250
01668*       149               DO 290 I=1,NRECEP                                               OUT02260
01669*       150               CMAX=-1.0                                                       OUT02270
01670*       151               DO 280 K=1,NRECEP                                               OUT02280
01671*       152               IF (HSAV(K).LE.CMAX) GO TO 280                                  OUT02290
01672*       153               CMAX=HSAV(K)                                                    OUT02300
01673*       154               LMAX=K                                                          OUT02310
01674*       155      280      CONTINUE                                                        OUT02320
01675*       156               IRANK(LMAX)=I                                                   OUT02330
01676*       157               HSAV(LMAX)=-1.0                                                 OUT02340
01677*       158      290      CONTINUE                                                        OUT02350
01678*       159               DO 300 K=1,NRECEP                                               OUT02360
01679*       160               WRITE (IO,510) K,STAR(1,K),STAR(2,K),(RNAME(J,K),J=1,2),RREC(K),SROUT02370
01680*                        1EC(K),ZR(K),ELR(K),PSIGS(K,26),PCHI(K),IRANK(K)                 OUT02380
01681*       161      300      CONTINUE                                                        OUT02390
01682*       162      310      IF (IOPT(24).EQ.0) GO TO 330                                    OUT02400
01683*                C           PUNCH CONCENTRATIONS FOR CONTOURING(MICROGRAMS/CUBIC METER)  OUT02410
01684*                C           RECEPTOR COORDINATES IN USER UNITS.                          OUT02420
01685*       163               DO 320 K=1,NRECEP                                               OUT02430
01686*       164               GWU=PCHI(K)*1.0E+06                                             OUT02440
01687*       165               WRITE (IO,580) RREC(K),SREC(K),GWU,K,ZR(K),ELR(K)               OUT02450
01688*       166               WRITE (1,560) RREC(K),SREC(K),GWU,K,ZR(K),ELR(K)                OUT02460
01689*       167      320      CONTINUE                                                        OUT02470
01690*       168      330      IF (IOPT(23).EQ.0) GO TO 340                                    OUT02480
01691*                C           WRITE PERIODIC CONC. TO DISK/TAPE - FOR LONG-TERM APPLICATION OUT02490
01692*                C           FOR EACH RUN, THIS WRITE STATEMENT WILL GENERATE             OUT02500
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01693*                C        *NPER* RECORDS.                                           OUT02510
01694*     169              WRITE (13) IDATE(2),NB,(PCHI(K),K=1,NRECEP)                  OUT02520
01695*     170        340   RETURN                                                       OUT02530
01696*                C                                                                  OUT02540
01697*                C->->->->SECTION OUTHR.M - FORMATS.                                OUT02550
01698*                C                                                                  OUT02560
01699*                C** SECTIONS OF SUBROUTINE OUTHR.                                  OUT02570
01700*                C        SECTION OUTHR.A -  COMMON, DIMENSION, AND DATA.           OUT02580
01701*                C        SECTION OUTHR.B -  WRITE HOURLY CONTRIBUTION TITLE.       OUT02590
01702*                C        SECTION OUTHR.C -  WRITE HOURLY MET. DATA.                OUT02600
01703*                C        SECTION OUTHR.D -  WRITE FINAL PLUME HEIGHT AND DISTANCE TO  OUT02610
01704*                C                              FINAL RISE.                         OUT02620
01705*                C        SECTION OUTHR.E -  WRITE HOURLY SIGNIFICANT SOURCE CONTRIB.  OUT02630
01706*                C        SECTION OUTHR.F -  WRITE HOURLY SUMMARY TITLE.            OUT02640
01707*                C        SECTION OUTHR.G -  WRITE HOURLY MET. DATA.                OUT02650
01708*                C        SECTION OUTHR.H -  WRITE FINAL PLUME HEIGHT AND DISTANCE TO  OUT02660
01709*                C                              FINAL RISE.                         OUT02670
01710*                C        SECTION OUTHR.I -  WRITE HOURLY SUMMARY TABLE.            OUT02680
01711*                C        SECTION OUTHR.J -  ENTRY POINT FOR AVERAGING TIME.        OUT02690
01712*                C        SECTION OUTHR.K -  WRITE AVERAGING-TIME SIGNIFICANT SOURCE  OUT02700
01713*                C                              CONTRIBUTIONS.                      OUT02710
01714*                C        SECTION OUTHR.L -  WRITE AVERAGING-TIME SUMMARY.          OUT02720
01715*                C        SECTION OUTHR.M -  FORMATS.                               OUT02730
01716*                C                                                                  OUT02740
01717*     171        350   FORMAT ('1',20A4/1X,20A4/1X,20A4)                            OUT02750
01718*     172        360   FORMAT('0',T30,A4,' CONTRIBUTION(MICROGRAMS/M**3) FROM SIGNIFICANTOUT02760
01719*                     1 POINT SOURCES ',5X,I2,'/',I4,' : HOUR ',I2//)             OUT02770
01720*     173        370   FORMAT (1H0,T5,'RANK')                                       OUT02780
01721*     174        380   FORMAT ('+',T12,10(I3,7X))                                   OUT02790
01722*     175        390   FORMAT ('+',T113,'TOTAL      TOTAL '/1X,T113,'SIGNIF    ALL POINT '/1OUT02800
01723*                     1X,T113,'POINT      SOURCES'/1X,'SOURCE #')                 OUT02810
01724*     176        400   FORMAT (1X,'RECEP #')                                        OUT02820
01725*     177        410   FORMAT (1X,I3,2A1,6P10F10.3)                                 OUT02830
01726*     178        420   FORMAT ('+',T109,6P2F10.3)                                   OUT02840
01727*     179        430   FORMAT (1X,'SOURCE #',T12,10(I3,7X))                         OUT02850
01728*     180        440   FORMAT('0',T25,A4,' SUMMARY CONCENTRATION TABLE (MICROGRAMS/M**3) 'OUT02860
01729*                     15X,I2,'/',I4,' ',' HOUR ',I2/1X)                           OUT02870
01730*     181        450   FORMAT (1X,T2,'HOUR   THETA    SPEED   MIXING   TEMP   STABILITY'/OUT02880
01731*                     11X,T9,'(DEG)    (M/S) HEIGHT(M)   (K)     CLASS'/1X)     OUT02890
01732*     182        460   FORMAT (1X,T3,I2,4F9.2,6X,I1//)                              OUT02900
01733*     183        470   FORMAT (13X,10I11)                                           OUT02910
01734*     184        480   FORMAT (' FINAL HT (M) ',10F11.2)                            OUT02920
01735*     185        490   FORMAT (' DIST FIN HT (KM)',10F11.3)                         OUT02930
01736*     186        500   FORMAT ('0',T7,'RECEPTOR',T28,'EAST',T33,'NORTH',T43,'RECEPTOR HT 'OUT02940
01737*                     1,T61,'RECEPTOR',T78,'TOTAL FROM',T93,'TOTAL FROM',T106,'CONCENTRATOUT02950
01738*                     2ION'/' ',T7,'NO. NAME',T22,'COORD',T33,'COORD',T44,'ABV GRD (M)',TOUT02960
01739*                     359,'GRD-LVL ELEV',T77,'SIGNIF POINT',T93,'ALL SOURCES',T111,'RANK'OUT02970
01740*                     4/' ',T58,'(USER HT UNITS)',T80,'SOURCES'//)                OUT02980
01741*     187        510   FORMAT (1H ,I8,2A1,2X,2A4,2F10.2,F12.1,F20.1,6P2F15.4,I15)   OUT02990
01742*     188        520   FORMAT ('0',T22,I2,'-HOUR AVERAGE ',A4,' CONTRIBUTION(MICROGRAMS/MOUT03000
```

SUBROUTINE OUTHR

```
01743*                   1**3) FROM SIGNIFICANT POINT SOURCES',5X,I2,'/',I3,'  START HOUR: 'OUT03010
01744*                   2,I2//1X,T5,'RANK')                                                OUT03020
01745*       189    530   FORMAT ('0',T25,I2,'-HOUR AVERAGE ',A4,' SUMMARY CONCENTRATION TABOUT03030
01746*                   1LE(MICROGRAMS/M**3)',5X,I2,'/',I3,'  START HOUR: ',I2//1X)        OUT03040
01747*       190    540   FORMAT ('CNTL',1X,3F10.3,20X,I4,2F10.1)                            OUT03050
01748*              C                                                                       OUT03060
01749*       191          END                                                               OUT03070
```

```
                         SUBROUTINE OUTHR

SYMBOL     = = = = = = = = = = = = = = =   REFERENCES   = = = = = = = = = = = = = = = =

  10    -    12      15*
  20    -    15      19*
  30    -    25      28*
  40    -    19      30*
  50    -    34      35*
  60    -    44      46*
  70    -    36      48*
  80    -    54      55*
  90    -    63      65*
 100    -     9      29      47      66*
 110    -    69      72*
 120    -    72      76*
 130    -    77      78*
 140    -    81      82      85*
 150    -    79      88*
 160    -    89      91*
 170    -    66      92*
 180    -    97      98*
 190    -    94      99*
 200    -   108     111*
 210    -   103     113*
 220    -   116     117*
 230    -   125     127*
 240    -   118     129*
 250    -   134     135*
 260    -   142     144*
 270    -   100     112     128     145*
 280    -   151     152     155*
 290    -   149     158*
 300    -   159     161*
 310    -   145     162*
 320    -   163     167*
 330    -   162     168*
 340    -   168     170*
 350    -    10WR    37WR    48WR    56WR    67WR   101WR   119WR   129WR   136WR   146WR
            171*
 360    -    11WR    38WR    49WR    57WR   172*
 370    -    20WR    30WR    39WR    50WR    58WR   173*
 380    -    21WR    23WR    31WR    40WR    42WR    51WR    59WR    61WR   104WR   106WR
            113WR   121WR   123WR   131WR   138WR   140WR   174*
 390    -    22WR    41WR    60WR   105WR   122WR   139WR   175*
 400    -    24WR    33WR    43WR    53WR    62WR   107WR   115WR   124WR   133WR   141WR
            176*
 410    -    26WR    35WR    45WR    55WR    64WR   109WR   117WR   126WR   135WR   143WR
            177*
 420    -    27WR    46WR    65WR   110WR   137WR   144WR   178*
 430    -    32WR    52WR   114WR   132WR   179*
 440    -    68WR   180*
```

```
                                      SUBROUTINE OUTHR

450      -     13WR    70WR    181*
460      -     14WR    71WR    182*
470      -     16WR    73WR    183*
480      -     17WR    74WR    184*
490      -     18WR    75WR    185*
500      -     76WR   148WR    186*
510      -     90WR   160WR    187*
520      -    102WR   120WR    130WR   137WR   188*
530      -    147WR   189*
540      -    165WR   166WR    190*
CMAX     -     80=     82      83=     150=    152     153=
DSAV     -     3C0     18WR    75WR
FLP      -     3C0     90WR    160WR   165WR   166WR
GWU      -    164=    165WR    166WR
HSAV     -     3C0     17WR    78WR    79=     82      83      87=     96=     152     153
              157=
I        -     16WR    16WR    17WR    17WR    18WR    18WR    21WR    21WR    23WR    23WR
               26WR    26WR    31WR    31WR    32WR    32WR    35WR    35WR    40WR    40WR
               42WR    42WR    45WR    45WR    51WR    51WR    52WR    52WR    55WR    55WR
               59WR    59WR    61WR    61WR    64WR    64WR    73WR    73WR    74WR    74WR
               75WR    75WR    79      86      97      98      98     104WR   104WR   106WR
              106WR   109WR   109WR   113WR   113WR   114WR   114WR   117WR   117WR   121WR
              121WR   123WR   123WR   126WR   126WR   131WR   131WR   132WR   132WR   135WR
              135WR   138WR   138WR   140WR   140WR   143WR   143WR   149     156
IDATE    -     3C0     11WR    38WR    49WR    57WR    68WR   102WR   120WR   130WR   137WR
              147WR   169WR
IKST     -     4C0     18WR    71WR
IO       -     4C0     10WR    11WR    13WR    14WR    16WR    17WR    18WR    20WR    21WR
               22WR    23WR    24WR    26WR    27WR    30WR    31WR    32WR    33WR    35WR
               37WR    38WR    39WR    40WR    41WR    42WR    43WR    45WR    46WR    48WR
               49WR    50WR    51WR    52WR    53WR    55WR    56WR    57WR    58WR    59WR
               60WR    61WR    62WR    64WR    65WR    67WR    68WR    70WR    71WR    73WR
               74WR    75WR    76WR    90WR   101WR   102WR   104WR   105WR   106WR   107WR
              109WR   110WR   113WR   114WR   115WR   117WR   119WR   120WR   121WR   122WR
              123WR   124WR   126WR   127WR   129WR   130WR   131WR   132WR   133WR   135WR
              136WR   137WR   138WR   139WR   140WR   141WR   143WR   144WR   146WR   147WR
              148WR   160WR   165WR
IOPT     -     2C0     9       12      15      66      69      72      100     145     162
              168
IPOI     -     3C0     8
IPOLY    -     5DI     6DA     7       8
IPOLU    -     7=      8=      11WR    38WR    49WR    57WR    68WR   102WR   120WR   130WR
              137WR   147WR
IRANK    -     4C0     86=     90WR    156=    160WR
J        -     90WR    90WR    160WR   160WR
K        -     25      26WR    26WR    26WR    26WR    27WR    27WR    34      35WR    35WR
               35WR    35WR    44      45WR    45WR    45WR    45WR    46WR    46WR    54
               55WR    55WR    55WR    55WR    63      64WR    64WR    64WR    64WR    65WR
               65WR    77      78      79      81      82      83      88      89      90WR
               90WR    90WR    90WR    90WR    90WR    90WR    90WR    90WR    90WR    90WR
```

```
                              SUBROUTINE OUTHR

                 94      95      95      96      96      98      98      1 08    1 09WR  1 09WR
                 1 09WR  1 09WR  1 10WR  1 10WR  1 16    1 17WR  1 17WR  1 17WR  1 17WR  1 25
                 1 26WR  1 26WR  1 26WR  1 26WR  1 27WR  1 27WR  1 34    1 35WR  1 35WR  1 35WR
                 1 35WR  1 42    1 43WR  1 43WR  1 43WR  1 43WR  1 44WR  1 44WR  1 51    1 52
                 1 53    1 58    1 59    1 60WR  1 60WR  1 60WR  1 60WR  1 60WR  1 60WR  1 60WR
                 1 60WR  1 60WR  1 60WR  1 60WR  1 63    1 64    1 65WR  1 65WR  1 65WR  1 65WR
                 1 65WR  1 66WR  1 66WR  1 66WR  1 66WR  1 66WR  1 69WR  1 69WR
LH       -       3C0     11WR    14WR    14WR    14WR    14WR    14WR    14WR    38WR    49WR
                 57WR    68WR    71WR    71WR    71WR    71WR    71WR    71WR
LINE1    -       4C0     10WR    37WR    48WR    56WR    67WR    1 01WR  1 19WR  1 29WR  1 36WR
                 1 46WR
LINE2    -       4C0     10WR    37WR    48WR    56WR    67WR    1 01WR  1 19WR  1 29WR  1 36WR
                 1 46WR
LINE3    -       4C0     10WR    37WR    48WR    56WR    67WR    1 01WR  1 19WR  1 29WR  1 36WR
                 1 46WR
LMAX     -       84=     86      87      1 54=   1 56    1 57
MO       -       4C0
MPO      -       3C0
MPOP     -       2C0
MPS      -       4C0     23WR    32WR    42WR    52WR    61WR    1 06WR  1 14WR  1 23WR  1 32WR
                 1 40WR
NAVG     -       3C0     95      98      1 02WR  1 20WR  1 30WR  1 37WR  1 47WR
NB       -       3C0     1 02WR  1 20WR  1 30WR  1 37WR  1 47WR  1 69WR
NPT      -       3C0     17WR    18WR    74WR    75WR
NRECEP   -       3C0     25      38      44      58      63      77      79      81      89
                 94      1 08    1 16    1 25    1 38    1 42    1 49    1 51    1 59    1 63
                 1 69WR
NSIGP    -       4C0     19      21WR    23WR    26WR    36      40WR    42WR    45WR    59WR
                 61WR    64WR    1 03    1 04WR  1 06WR  1 09WR  1 18    1 21WR  1 23WR  1 26WR
                 1 38WR  1 40WR  1 43WR
OUTAVG   -       93EY
OUTHR    -       1EY
PCHI     -       3C0     95=     95      96      1 10WR  1 27WR  1 44WR  1 60WR  1 64    1 69WR
PHCHI    -       3C0     27WR    46WR    65WR    78      90WR
PHSIGS   -       3C0     26WR    27WR    35WR    45WR    46WR    55WR    64WR    65WR    90WR
PSIGS    -       3C0     98=     98      1 09WR  1 10WR  1 17WR  1 26WR  1 27WR  1 35WR  1 43WR
                 1 44WR  1 60WR
QHL      -       4C0     14WR    71WR
QTEMP    -       4C0     14WR    71WR
QTHETA   -       4C0     14WR    71WR
QU       -       4C0     14WR    71WR
RNAME    -       4C0     90WR    1 60WR
RREC     -       3C0     90WR    1 60WR  1 65WR  1 66WR
SREC     -       3C0     90WR    1 60WR  1 65WR  1 66WR
STAR     -       4C0     26WR    26WR    35WR    35WR    45WR    45WR    55WR    55WR    64WR
                 64WR    90WR    90WR    1 09WR  1 09WR  1 17WR  1 17WR  1 26WR  1 26WR  1 35WR
                 1 35WR  1 43WR  1 43WR  1 60WR  1 60WR
ZR       -       3C0     90WR    1 60WR  1 65WR  1 66WR
-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
********** SUPER INDEX **********

SYMBOL - ============== ROUTINES IN WHICH THE SYMBOL IS USED ==========

A       -  MAIN P
A1      -  RCP
A2      -  RCP
A3      -  RCP
A4      -  RCP
A5      -  RCP
A6      -  RCP
A7      -  RCP
AA      -  PGYZ
AB      -  PGYZ
AD      -  PGYZ
AE      -  PGYZ
AF      -  PGYZ
ALOG    -  PGYZ
AN      -  RCP
ANAME   -  MAIN P
ANGARC  -  ANGARC     MAIN P
ATAN    -  ANGARC
ATIME   -  MAIN P
B       -  MAIN P
BA      -  PGYZ
BB      -  PGYZ
BD      -  PGYZ
BE      -  PGYZ
BF      -  PGYZ
BLNK    -  MAIN P
BUOY    -  PTR
C1      -  RCP
C2      -  RCP
C3      -  RCP
C4      -  RCP
C5      -  RCP
C6      -  RCP
C7      -  RCP
C8      -  RCP
C9      -  RCP
CA      -  RCP
CB      -  RCP
CC      -  RCP
CD      -  RCP
CE      -  RCP
CELM    -  MAIN P     PTR
CENTX   -  MAIN P
CENTY   -  MAIN P
CF      -  RCP
CMAX    -  OUTHR
CONC    -  MAIN P     RANK
CONONE  -  MAIN P
```

```
********** SUPER INDEX **********

CONTER   -  MAIN P
CONTWO   -  MAIN P    PTR
COS      -  MAIN P    PGYZ
COSRAD   -  MAIN P
COST     -  MAIN P    PTR
CTER     -  MAIN P    PTR
D        -  MAIN P    PTR
DAY      -  MAIN P
DAY1     -  MAIN P
DAY1A    -  MAIN P
DAY2     -  MAIN P
DELH     -  PTR       RCP
DELM     -  ANGARC    MAIN P
DELN     -  ANGARC    MAIN P
DELT     -  PTR
DH       -  PTR
DHA      -  PTR
DISTF    -  PTR
DSAV     -  MAIN P    OUTHR     PTR
DTHOZ    -  PTR
DTMB     -  PTR
DUM      -  MAIN P    PTR       RCP
DUMR     -  MAIN P
ELMN     -  MAIN P    PTR
ELOW     -  MAIN P
ELP      -  MAIN P    PTR
ELR      -  MAIN P    OUTHR     PTR
ELRDUM   -  MAIN P
ENDP     -  MAIN P
ENDR     -  MAIN P
EP       -  PTR
ER       -  PTR
EXP      -  PTR       RCP
F        -  MAIN P    PTR
FLOAT    -  MAIN P
FP       -  PTR
GWU      -  OUTHR
H        -  PTR       RCP
HAFL     -  MAIN P
HANE     -  MAIN P    PTR
HC       -  MAIN P
HC1      -  BL DAT    MAIN P
HF       -  MAIN P
HI1      -  MAIN P
HI2      -  MAIN P
HIMAX    -  MAIN P
HL       -  MAIN P    PTR       RCP
HLM      -  MAIN P
HMAXA    -  MAIN P    RANK
HPR      -  PTR
```

```
                                      ********** SUPER INDEX **********

          HPRM     -   PTR
          HR1      -   MAIN P
          HR2      -   MAIN P
          HSAV     -   MAIN P     OUTHR      PTR
          I        -   MAIN P     OUTHR
          ID       -   MAIN P     PGYZ
          IDATE    -   MAIN P     OUTHR      PTR
          IDATP    -   MAIN P
          IDAY     -   MAIN P
          IDAYS    -   MAIN P
          IDCK     -   MAIN P
          IDM      -   MAIN P
          IDUM     -   MAIN P
          IFREQ    -   MAIN P
          IH       -   MAIN P
          IH1      -   MAIN P
          IH2      -   MAIN P
          IHR      -   MAIN P     RANK
          IHSTRT   -   MAIN P
          IJ       -   RANK
          IJP1     -   RANK
          IKST     -   MAIN P     OUTHR
          ILH      -   MAIN P
          IM1      -   MAIN P
          IMO      -   MAIN P
          IMPS     -   MAIN P
          IMXD     -   MAIN P
          IMYYR    -   MAIN P
          IN       -   MAIN P
          INPT     -   MAIN P
          IO       -   MAIN P     OUTHR      RANK       RCP
          IOPT     -   MAIN P     OUTHR      PTR        RCP
          IP       -   MAIN P
          IP1      -   MAIN P
          IPOL     -   MAIN P     OUTHR      PTR
          IPOLT    -   OUTHR
          IPOLU    -   OUTHR
          IPSIGS   -   MAIN P     PTR
          IQ       -   MAIN P
          IRANK    -   OUTHR
          IS       -   MAIN P
          ISECD    -   MAIN P
          ISECYR   -   MAIN P
          ISKIP    -   MAIN P
          ISTDAY   -   MAIN P
          IYEAR    -   MAIN P
          IYM      -   MAIN P
          J        -   MAIN P     OUTHR      PTR        RANK
          JA       -   MAIN P
          JDAY     -   MAIN P     RANK
```

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********** SUPER INDEX **********

JHR     -  MAIN P
JYR     -  MAIN P
K       -  MAIN P   OUTHR    PTR      RANK
K1      -  MAIN P
K2      -  MAIN P
KMX     -  MAIN P
KSIG    -  PTR
KST     -  MAIN P   PGYZ     PTR      RCP
KSUM    -  MAIN P
L       -  MAIN P   RANK
LDRUN   -  MAIN P
LH      -  MAIN P   OUTHR    PTR      RANK
LINE1   -  MAIN P   OUTHR
LINE2   -  MAIN P   OUTHR
LINE3   -  MAIN P   OUTHR
LMAX    -  MAIN P   OUTHR
LSMAX   -  MAIN P
LST     -  MAIN P
LSTAB   -  MAIN P
MAXP    -  MAIN P
MOD     -  MAIN P
MPS     -  MAIN P   OUTHR
NAVS    -  MAIN P
NAVG    -  MAIN P   OUTHR
NAVT    -  MAIN P
NB      -  MAIN P   OUTHR
NDAY    -  MAIN P   RANK
NE      -  MAIN P
NHR     -  MAIN P
NHRS    -  MAIN P
NP      -  MAIN P
NP2A    -  MAIN P
NP3     -  MAIN P
NP8     -  MAIN P
NPER    -  MAIN P
NPT     -  MAIN P   OUTHR    PTR
NPY     -  MAIN P
NRECEP  -  MAIN P   OUTHR    PTR      RANK
NSIGP   -  MAIN P   OUTHR
NTIME   -  MAIN P
OUTAVG  -  MAIN P
OUTHR   -  MAIN P
PARTC   -  PTR
PCHI    -  MAIN P   OUTHR    PTR
PERSIS  -  MAIN P
PGYZ    -  RCP
PHCHI   -  MAIN P   OUTHR    PTR
PHSIGS  -  MAIN P   OUTHR    PTR
PL      -  MAIN P   PTR
PNAME   -  MAIN P
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```
********** SUPER INDEX **********

PROD    -  PTR
PSAV    -  MAIN P   PTR
PSIGS   -  MAIN P   OUTHR    PTR
PTR     -  MAIN P
PXUCOF  -  BL DAT   MAIN P
PXUEXP  -  BL DAT   MAIN P
QHL     -  MAIN P   OUTHR
QTEMP   -  MAIN P   OUTHR
QTHETA  -  MAIN P   OUTHR
QU      -  MAIN P   OUTHR
RADIK   -  MAIN P
RADIL   -  MAIN P
RANK    -  MAIN P
RC      -  PTR      RCP
RCP     -  PTR
RNAME   -  MAIN P   OUTHR
RQ      -  PTR
RREC    -  MAIN P   OUTHR    PTR
S       -  PTR
SCALE   -  PTR
SIGMAX  -  MAIN P
SIN     -  MAIN P   PGYZ
SINRAD  -  MAIN P
SINT    -  MAIN P   PTR
SOURCE  -  MAIN P   PTR
SQ      -  PTR
SQRT    -  MAIN P   PTR      RCP
SREC    -  MAIN P   OUTHR    PTR
STAR    -  MAIN P   OUTHR
STR     -  MAIN P
SUM     -  MAIN P   RCP
SY      -  PGYZ     RCP
SZ      -  PGYZ     RCP
T       -  RCP
TABLE   -  MAIN P
TEMP    -  MAIN P   PTR      RCP
TH      -  PGYZ
THETA   -  MAIN P
THL     -  RCP
THT     -  PTR
TITLE   -  MAIN P
TLOS    -  MAIN P   PTR
TOM     -  MAIN P
TRAD    -  MAIN P
TS      -  MAIN P   PTR
TT      -  PTR
U       -  MAIN P   PTR
UPH     -  PTR
UPL     -  PTR      RCP
UR      -  MAIN P
```

```
********** SUPER INDEX **********

URES    -   MAIN P
VP      -   MAIN P
VS      -   PTR
X       -   PGYZ       PTR        RCP
XA      -   PGYZ
XB      -   PGYZ
XD      -   PGYZ
XDUM    -   PTR
XE      -   PGYZ
XF      -   PGYZ
XY      -   PGYZ
Y       -   PTR        RCP
YD      -   RCP
YDUM    -   PTR
Z       -   PTR        RCP
ZP      -   MAIN P     OUTHR      PTR
**************************************************************************************
```

Date____________________

Chief, Environmental Operations Branch
Meteorology and Assessment Division (MD-80)
U.S. Environmental Protection Agency
RESRCH TRI PK, NC 27711

I would like to receive future revisions to the *User's Guide for MPTER*.

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